OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

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VOLUME 40, No. 17

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY • BLEACHING • DYEING • PRINTING • FINISHING

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FOR *Brighter* SHADES ON WOOLENS AND SILKS

Geigy's POLAR COLORS have long been the standard choice for producing clear, bright shades on silks, woolens, worsteds or blends of silk and wool.

Extremely useful for brightening chrome colors wherever lively shades are called for on wool, the POLAR COLORS can also be dyed neutral or with weak acid. Dyeings rate high in wash fastness, withstand light fulling and possess commendable light fastness.

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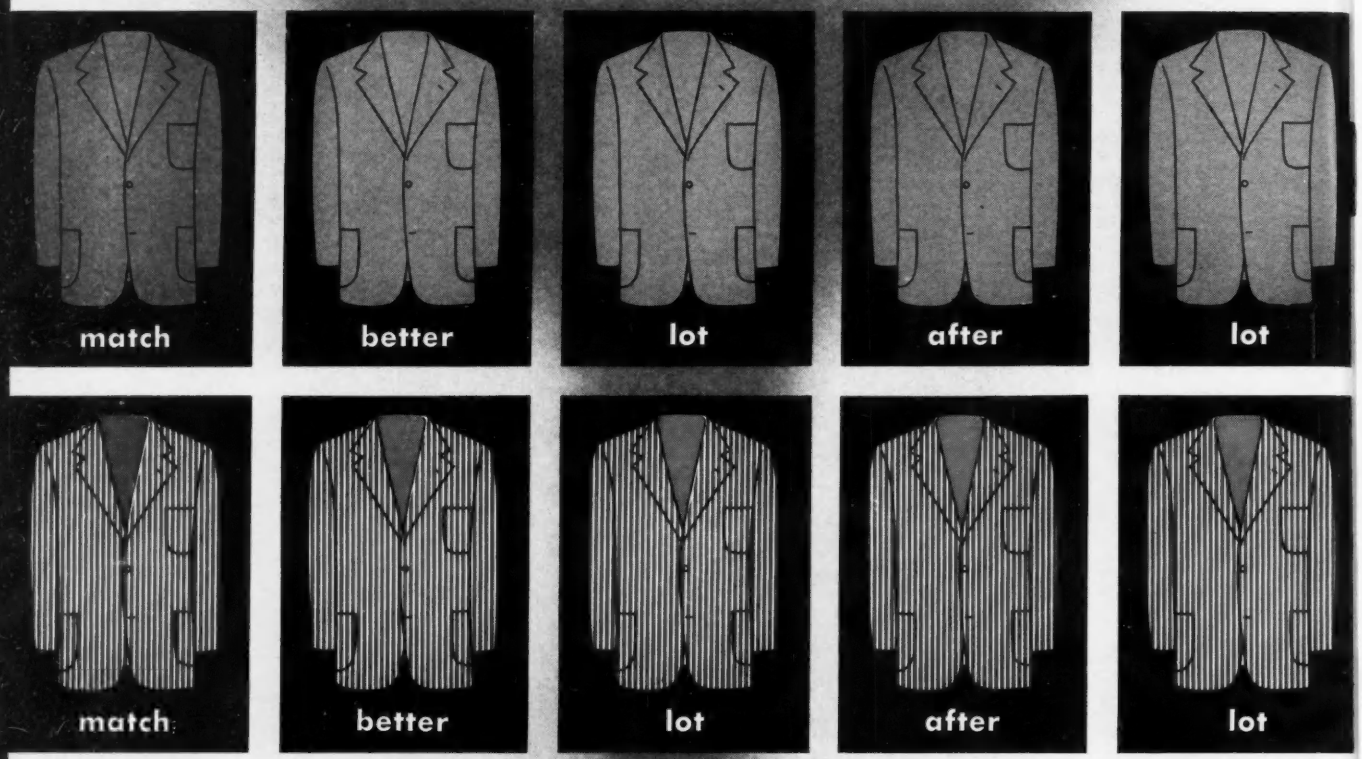
uniformity



Color uniformity and fastness are the things you want in the dyestuffs you purchase . . . in order that you, in turn, can deliver color uniformity and fastness in the work you produce. Use ALTCO wash and light-fast dyestuffs — benefit from our more advanced methods, special equipment and precision control in dye making.

Whether you're dyeing fabrics for suits or draperies, for dresses or upholsteries, you can use ALTCO on all rayons, mixed fabrics and cottons with security, because they HOLD IN SERVICE. Our service staff is manned by experts with *many years of practical Dye House Experience*, who will solve your problems in our laboratories or right in your own mill. Call on us!

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"The" Printing Black for fabrics of

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This exceptionally fine black is time-tested for shade fastness, non-drying, and economy. Send for complete information on properties and applications.

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A carpet creation featuring:

*Amacel** BLUE GLF
YELLOW GLF
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for the carpet industry

More and more carpet manufacturers are asking A.A.P. to recommend colors especially designed for dyeing yarns of the acetate rayon type. Having pioneered the manufacture of acetate colors in the United States, A.A.P. is pre-eminently qualified to solve the problems presented.

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Refer your dye problems to our laboratories . . . capable, experienced engineers are ready to serve you.

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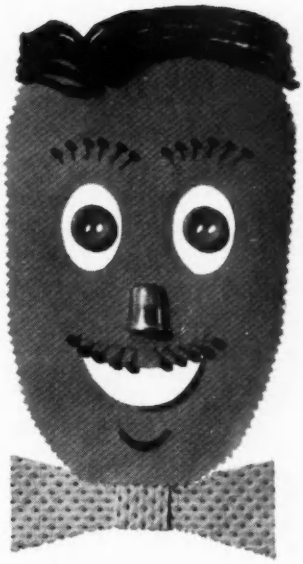
Finishing headaches?



Quick cure!

Some finishers take a pill to get rid of their on-the-job headaches.

The smart ones get in touch with Monsanto for Catalyst AC, for in hundreds of finishing plants, millions and millions of yards of goods have been resin-treated with the help of Catalyst AC. Catalyst AC cures the resin as fast or faster than other catalysts. In a customer test on an 80 x 80 cotton fabric, for example, we found resin retention fully comparable to that obtained with other catalysts, but the hand was softer and wrinkle-resistance superior. Here are the actual data:

% Urea Resin Applied	Catalyst	% Resin Retention	Stiffness (Gurley)	Wrinkle-Resistance
8%	AC	85%	4.7	137°
8%	DAP	86%	4.9	131°
8%	Competitive Catalyst	84%	5.0	130°

In addition to these *performance* advantages, think of the advantages in your mill. With Catalyst AC, as you know, a urea-formaldehyde bath (36% solids) is stable for 24 or more hours—not only a convenience, but in some mills a real money-saving plus. Of course Catalyst AC is completely compatible with the usual softeners and penetrants.

For more information or technical help at your plant, please write MONSANTO CHEMICAL COMPANY, Textile Chemicals Dept., Everett Station, Boston 49, Mass.

MONSANTO
CHEMICALS — PLASTICS
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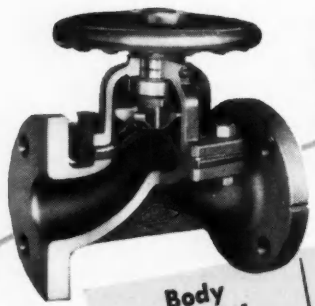
WHAT WOULD **YOU** SPECIFY . . .

	Fluid	Concentration	Temp.	Type of Valve	Valve Material
1	Sulphuric Acid	20%	120 F.		
2	Sulphuric Acid	100%	180 F.		
3	Hydrochloric Acid	32%	80 F.		
4	Hydrofluoric Acid	50%	125 F.		
5	Beer		200 F.		
6	Oxygen		Ambient		

In several of these cases other body materials or diaphragms would serve as well. But the really important fact is the unmatched versatility of Grinnell-Saunders Diaphragm Valves in handling corrosive fluids, gases, compressed air, food and suspended solids . . . in lines where corrosion, abrasion, contamination, clogging, leakage and maintenance are problems.

Grinnell-Saunders Valve bodies are stocked in cast iron, malleable iron, stainless steel, bronze, and aluminum, with other materials available on special order. Valve bodies can be lined with lead, glass, natural rubber or neoprene. Diaphragms are available of natural rubber and a number of synthetics to suit particular service conditions.

The Grinnell-Saunders Valve Division will be pleased to submit recommendations upon receipt of complete information covering service conditions.



We supplied Grinnell-Saunders Diaphragm Valves with . . .

	Body Material	Diaphragm Material
1	Rubber lined	Natural rubber
2	Cast iron	KEL-F
3	Glass lined	Butyl
4	Magnesium	KEL-F
5	Polished bronze	White diaphragm
6	Cast iron*	Neoprene

*For oxygen service a high flash point lubricant is supplied. All valves for oxygen service are subjected to 300 lb. air underwater test.

Features of the Grinnell-Saunders Diaphragm Valve

- diaphragm absolutely isolates working parts from fluid
- diaphragm lifts high for streamlined flow in either direction
- diaphragm presses tight for positive closure
- body, lining and diaphragm materials to suit service
- simple maintenance—diaphragm easily replaced

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DEVELOPMENT NEWS

New Specialized Grade of Sodium CMC Shows Great Promise in Sizing, Finishing and Printing

Carbose I in Warp Sizing

Extensive mill evaluations show that Carbose I is a valuable additive to starches for sizing viscose rayons, rayon-cotton blends and cottons. The optimum concentration of Carbose I in these formulations ranges from 1 to 25%, depending on the proposed application.

Carbose I not only helps form a protecting film, but also reduces stiffness. In most cases, no supplementary softener is required. In addition, the solubility of Carbose I makes desizing the warps and cleaning the slasher easier.

Carbose I in Finishing

By insolubilizing it with the addition of an aluminum salt, such as alum, Carbose I may be used in concentrations of 2 to 5% as a finishing agent. The product is not only highly resistant to scouring, but also gives the fabric an attractive hand.

Send Coupon for Sample —Test It Yourself!

Further information about Carbose I, its applications and a sample may be obtained by sending in the coupon at right. A sample of Carbose IM is also yours for the asking.

Carbose* I, recently developed by Wyandotte, is a technical grade of Sodium CMC manufactured under controlled conditions for consistent uniformity. Pilot tests and reports from users reveal that Carbose I does an excellent job as an additive and a finishing agent. Benefits range from product improvements to processing savings of time, trouble and money. Consensus of opinion is that there are many other applications for its profitable application, and Wyandotte's Development Department is receiving requests for samples that indicate more than an ordinary interest in this product. Carbose I is in good supply at a competitively low price.

Carbose I Available in Quantity and Low in Price

In these uncertain times, it's to a user's advantage to have a steady source of supply of essential materials. This helps him maintain both the volume and quality of his production. Carbose I is available in quantity and at a competitively low price.

Carbose IM in Printing Pastes

Carbose IM, a special form of Carbose I, has proved itself efficient for printing with insoluble azo colors, soluble vat colors, direct and acid colors on cotton, wool, silk and synthetics.

The thickener is quite soluble and easily removed from the cloth by a cold-water wash. Like Carbose I, Carbose IM is consistently uniform.

*REG. U. S. PAT. OFF.

Wyandotte
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DEVELOPMENT DEPARTMENT, AD-8

WYANDOTTE CHEMICALS CORPORATION, Wyandotte, Michigan

Please send me further information and a sample of ☐ Carbose I . . . ☐ Carbose IM.

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Company_____

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A lot of things can happen to woolen fibers while they're being transformed into yarns and finished fabrics. This is particularly true in the carding and spinning operations. Lubricate your fibers with the proper oil, and you're well on your way to good, saleable fabrics.

And one of the surest ways to head toward a "happy ending" for your finished fabrics is to give your woolen fibers the protection of Proxol.

CHECK THESE PROXOL ADVANTAGES!

In *Carding*

Stable Emulsions • Excellent Fiber Lubrication • Minimum Waste • Less Static • Less Fiber Breakage • No Gumming of Cards • No Corrosion • Better Condensing • More Production •

In *Spinning*

Fewer Ends Down • Stronger, More Uniform Yarns • Increased Spinning Production • More Yarn Per Package •

Proxol scours easily—regardless of the storage period. It won't heat up on storage . . . won't develop odors or discolorations. It's efficient...it's safe...it's economical. Try Proxol for a month and you'll understand why more and more textile men agree that it's today's "best buy" in wool oils.

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For the ELIMINATION *of* *TIPPY DYEING*

With Superior End Results at Lower Over-All Cost

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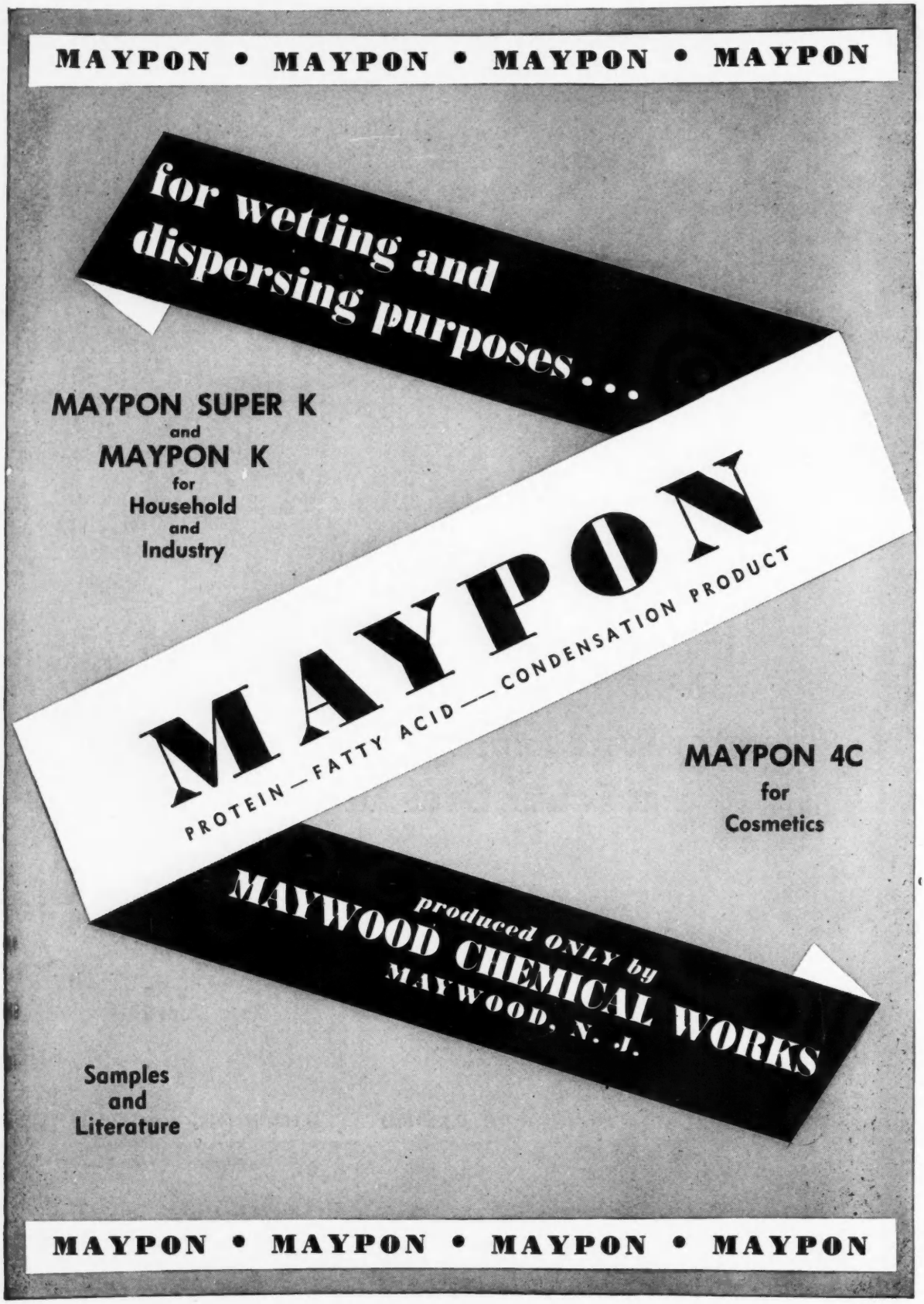
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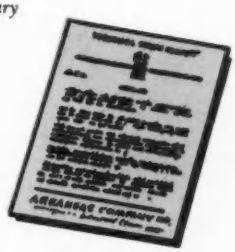

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Please send me, without obligation:

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Dileine Conc. has been developed to meet processing problems encountered in the dyeing of coarse cellulose acetate fibers and yarns for the carpet and wool industry.

A proper selection of acetate dyestuffs along with Dileine Conc. will result in dyeings that are highly resistant to atmospheric fading and sunlight. The slow exhausting properties of Dileine Conc. assures even distribution throughout the raw stock or heavy denier skeins.

Because of its stability to heat and slow exhausting properties, the use of Dileine Conc. requires no pre-treatment on conventional pressure dyeing equipment of acetate fibers ranging from 3 to 20 denier. This inhibitor has been used successfully for the dyeing of raw stock from a standing bath at high temperatures in a Hussong raw stock dyeing machine.

Dileine Conc. offers positive protection against atmospheric fading. Dileine Conc. assures rapid processing by even distribution throughout the material without sacrificing light fastness. Should you be interested, our technical service department would welcome the opportunity of submitting samples . . . custom-formulated . . . to meet your individual problems.

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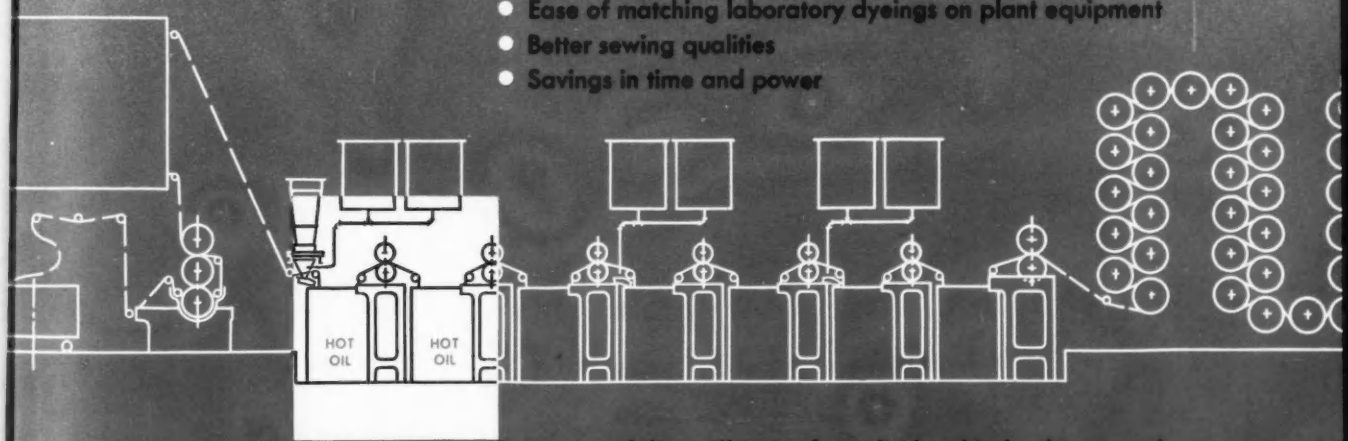
- Savings in time and power



Because of the millions of yards dyed in both vat and sulphur colors by the **HOT OIL PROCESS**, General Dyestuff Corporation's Technical Department is able to answer your questions on its adaptability to your requirements.

Inquiries should be addressed to our nearest office.

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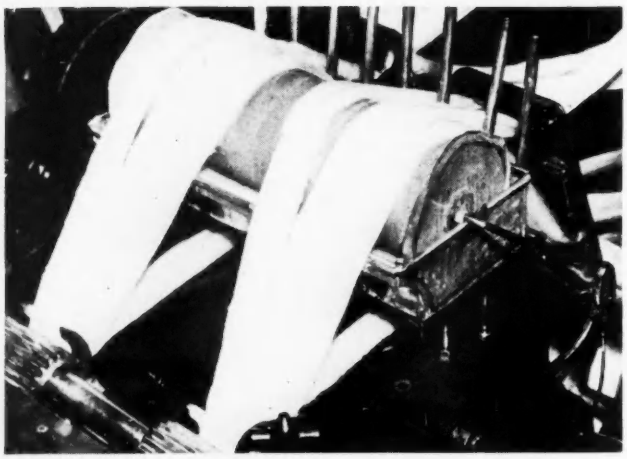
the ¢ FEW extra ¢ents that make a LOT of sense

When it comes to producing worsted yarn, there is always this important question: Should a spinner spend a few more cents than absolutely necessary when processing top, to try and achieve more efficient production and better finished products? In the case of Nopco* 1656-R, the answer is "yes".

Today; the price of top is the highest in history. Thus the few additional cents involved in the purchase of Nopco 1656-R become insignificant in the face of over-all costs. Moreover, the unique advantages afforded by this remarkable oil far outweigh its price differential when compared to alternatives. Just consider:

NOPCO* 1656-R...



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2. ***increases the drag, and thereby gives a better draft—resulting in more even and cleaner yarn;***
3. ***scours out with phenomenal ease—actually converting into suds when used with alkali, polyphosphate and water;***
4. ***applies equally to all production systems—American, Bradford or French—and is extremely advantageous on pin drafters.***

Yes, it will profit you to use Nopco 1656-R wherever you employ a lubricant in your top-processing procedure. And it will profit you to specify Nopco 1656-R, as a number of spinners already do, whenever you purchase oil-combed top. You'll pay a few more cents above "rock bottom" perhaps, but when you examine your finished yarns, you'll know you have produced high quality products with surprising economy.

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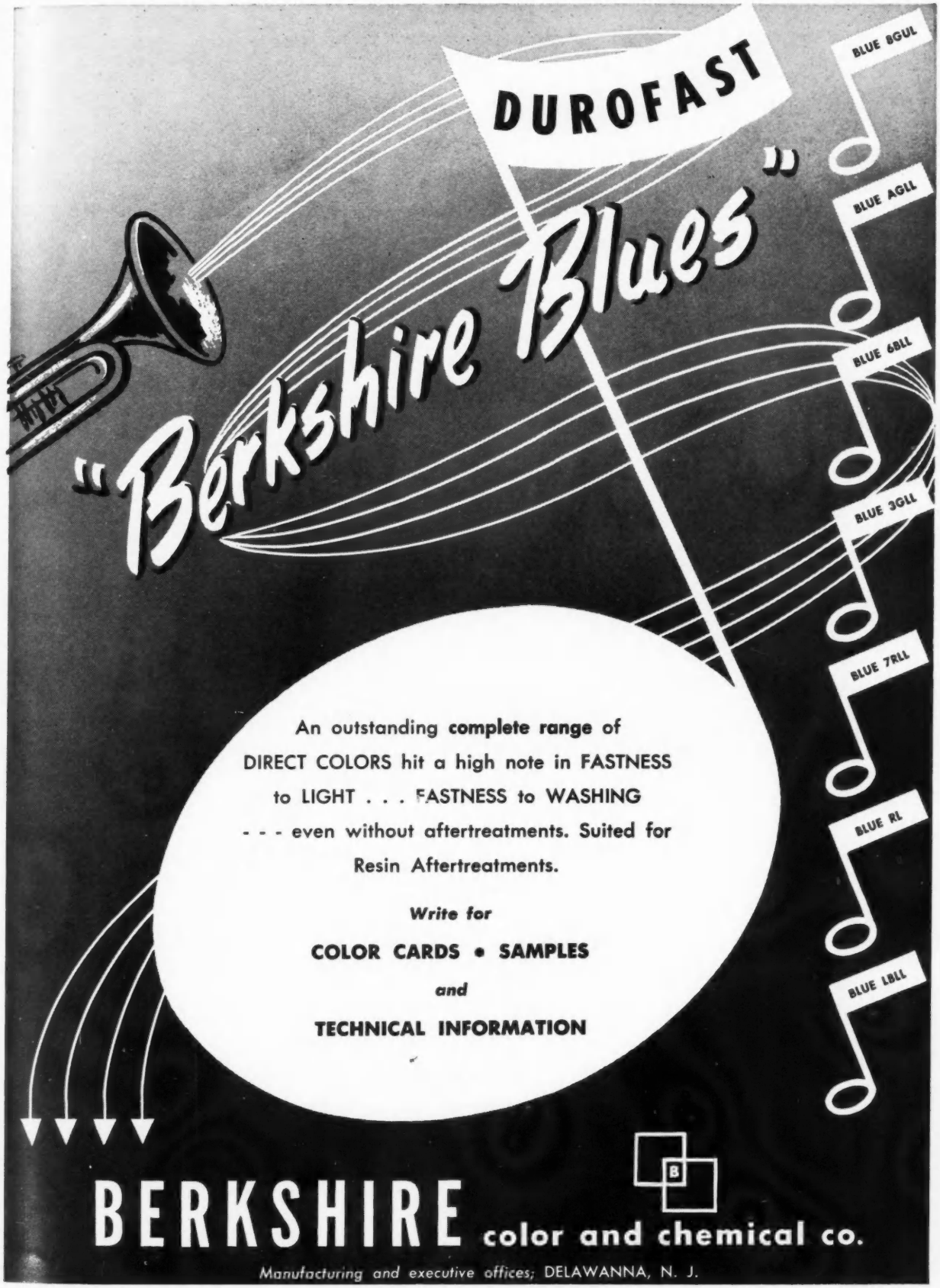
Send for your FREE copy of this bulletin giving detailed information about Nopco* 1656-R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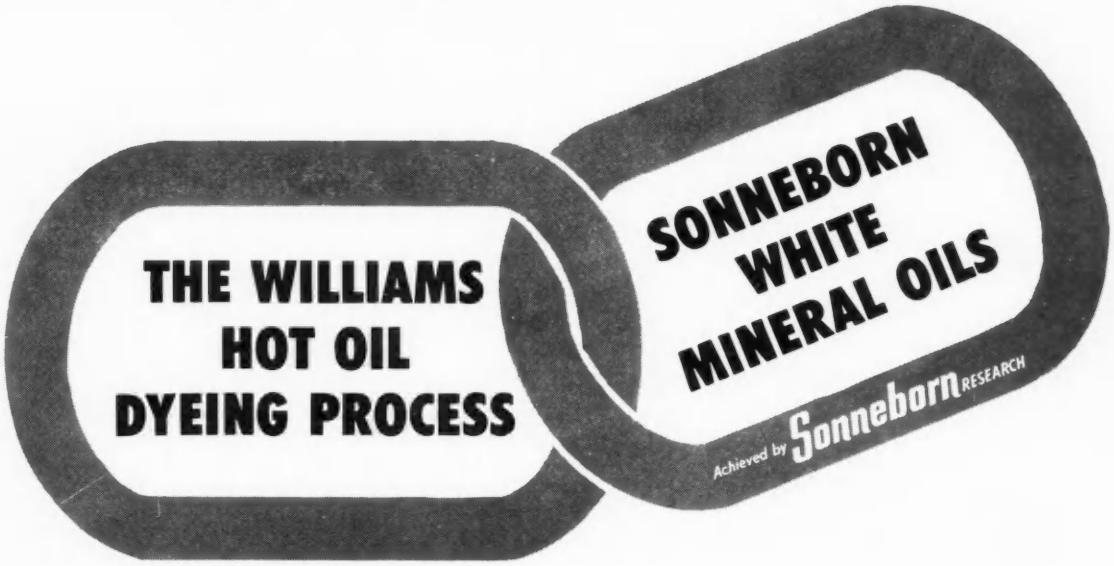

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  . . . free of unsaturates and aromatics—will not dissolve color
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  . . . outstanding stability results in high resistance to color and odor development
- **HIGH BOILING RANGES**
  . . . no evaporation loss at operating temperatures
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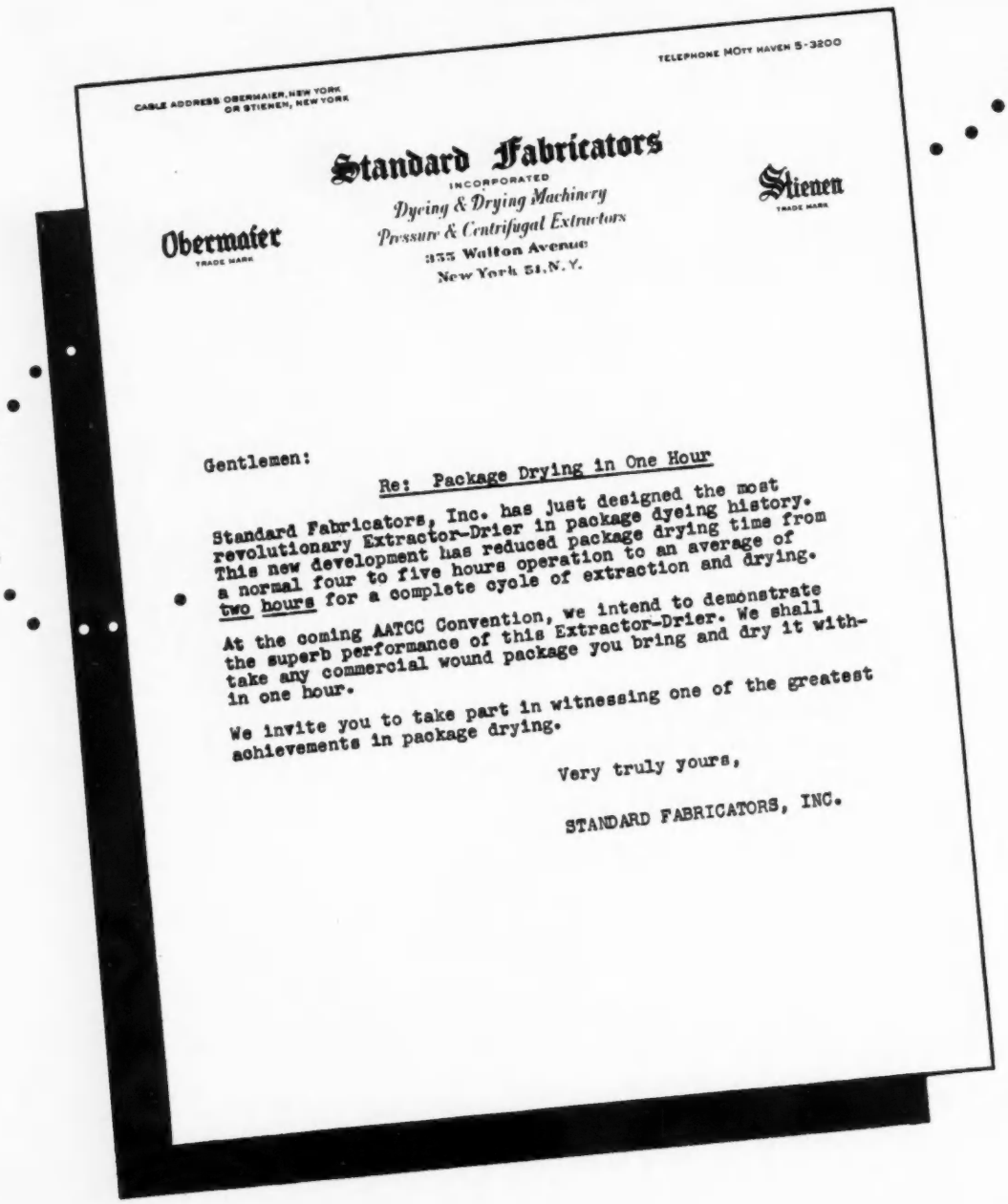
An open letter to package dyers . . .



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Re: Package Drying in One Hour

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At the coming AATCC Convention, we intend to demonstrate the superb performance of this Extractor-Drier. We shall take any commercial wound package you bring and dry it within one hour.

We invite you to take part in witnessing one of the greatest achievements in package drying.

Very truly yours,

STANDARD FABRICATORS, INC.

EASTMAN FAST BLUE GLF
CONCENTRATED

the first commercially proven blue acetate dye

with excellent

gas fastness and light fastness-BOTH!

Eastman chemists have been working for years to develop a blue acetate dye with high resistance to both gas and light. Eastman Fast Blue GLF Concentrated is the result. It's been checked in the laboratory and double checked by commercial dyers and converters. Our manufacturing process is proven.

In short, we are ready to provide you with the technical data, recommended dyeing procedures and, best of all, the dye—the first blue acetate dye which successfully combines excellent light fastness with excellent gas fastness.

It's your move now. Write for samples—call in your local Eastman dyestuff representative*—he'll be pleased to help you take full advantage of this important development in the field of acetate dyes. It's recommended for use not only on acetate, but also on dynel and Dacron polyester fiber.

Eastman Acetate Dyestuffs

*EASTMAN ACETATE DYESTUFFS are sold in the United States through Tennessee Eastman Company in Kingsport, Tennessee, and Lodi, New Jersey. On the West Coast, through Wilson Meyer Co.: San Francisco, Los Angeles, Portland, and Seattle. In Canada, through Clough Dyestuff Company Ltd., 33 St. Mathieu Street, St. Laurent, Quebec.

HOW LIXATE BRINE CUTS DYEING COSTS

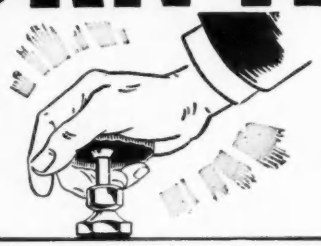
MORE UNIFORM DYEING: More and more plant managers are learning how to get better dyeing results, yet cut operating costs, by using Lixate brine. The use of saturated Lixate brine in the dye bath, instead of dry salt, improves the quality of finished goods by helping to eliminate spots, streaks and white edges. When dry salt is added, it tends to create areas of concentrated brine around the grains of salt. These concentrated areas drive excessive quantities of dye into fabrics, causing spots and streaks. Lixate brine helps overcome this difficulty because it disperses instantly and evenly through the bath, producing a smooth exhaustion of the dye.

CUTS SALT CONSUMPTION: Many mills report that they use approximately 12% less salt when Lixate brine is used in the dye bath. This is because saturated brine is more efficient as an exhausting agent. One gallon of saturated brine contains 2.65 pounds of salt. But when used as the exhausting agent, one gallon of saturated brine appears to be equivalent to three pounds of dry salt. This is the figure used for best dyeing results by actual experience.

CUTS OPERATING COSTS: Results at mills that have changed from dry salt to Lixate brine indicate that brine increases plant efficiency and reduces operating costs. The brine method not only helps eliminate redyeing, but also cuts down on unnecessary salt handling because brine is made automatically and piped throughout the plant.

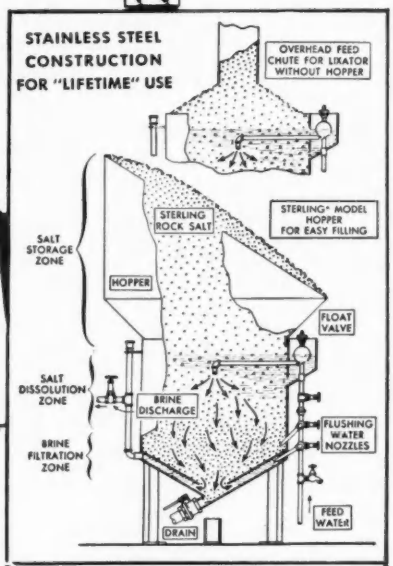
HOW IT WORKS: An engineering development of the International Salt Company, Inc., Scranton, Pennsylvania, the Lixator consists of a rock salt storage hopper over a dissolving tank with a brine collection chamber. Rock salt flows by gravity into the tank at the same rate it is dissolved, automatically replenishing the supply. Water enters near the top. As water flows downward, it dissolves the rock salt, until it becomes fully saturated some distance from the bottom of the tank. From that point on the remaining rock salt acts as a filter bed that removes all insoluble matter from the brine. As a result, when it reaches the collection chamber, the brine is crystal clear and fully saturated. Lixate brine is always crystal clear and neutral — free from acids and alkalies — and for that reason is also used to regenerate zeolite water softeners. The same Lixator provides saturated brine for this purpose and for use in the dye vats. Lixators may be made in any size to meet individual plant requirements.

JUST TURN IT AND GET BRINE



That's Just Right Without Measuring Or Stirring!

STERLING ROCK SALT
BRINE DELIVERED BY PIPE TO EVERY POINT IN YOUR PLANT
- DYEING MACHINES
- DYEING VATS
- ZEOLITE WATER SOFTENERS



• Why trust to "rule-of-thumb" measuring? Why go through the laborious shoveling, hauling, and hand stirring of salt and water? With International's Lixate Process for Making Brine you are assured accurate salt measurement every time. Stops waste through spilling. Saves time and labor.

• The Lixator *automatically* produces 100% saturated, free-flowing, crystal-clear brine which may be piped to as many points in your plant as you wish — any distance away — by gravity or pump. YOU SIMPLY TURN A VALVE to get self-filtered LIXATE Brine that meets the most exacting chemical and bacterial standards.

Savings up to 20% and often more in the cost and handling of salt have been reported by many Lixate users. Why not investigate?

HOW LIXATOR WORKS

In the dissolution zone—flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. **In the filtration zone**—through use of the **self-filtration** principle **originated by International**, the saturated brine is thoroughly filtered through a bed of undissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

WHAT THE LIXATOR PROVIDES

- ✓ **Chemical and bacterial purity to meet the most exacting standards for brine.**
- ✓ **Unvarying salt content of 2.65 pounds per gallon of brine.**
- ✓ **Crystal-clear brine.**
- ✓ **Continuous supply of brine.**
- ✓ **Automatic salt and water feed to Lixator.**
- ✓ **Inexpensive, rapid distribution of brine to points of use by pump and piping.**

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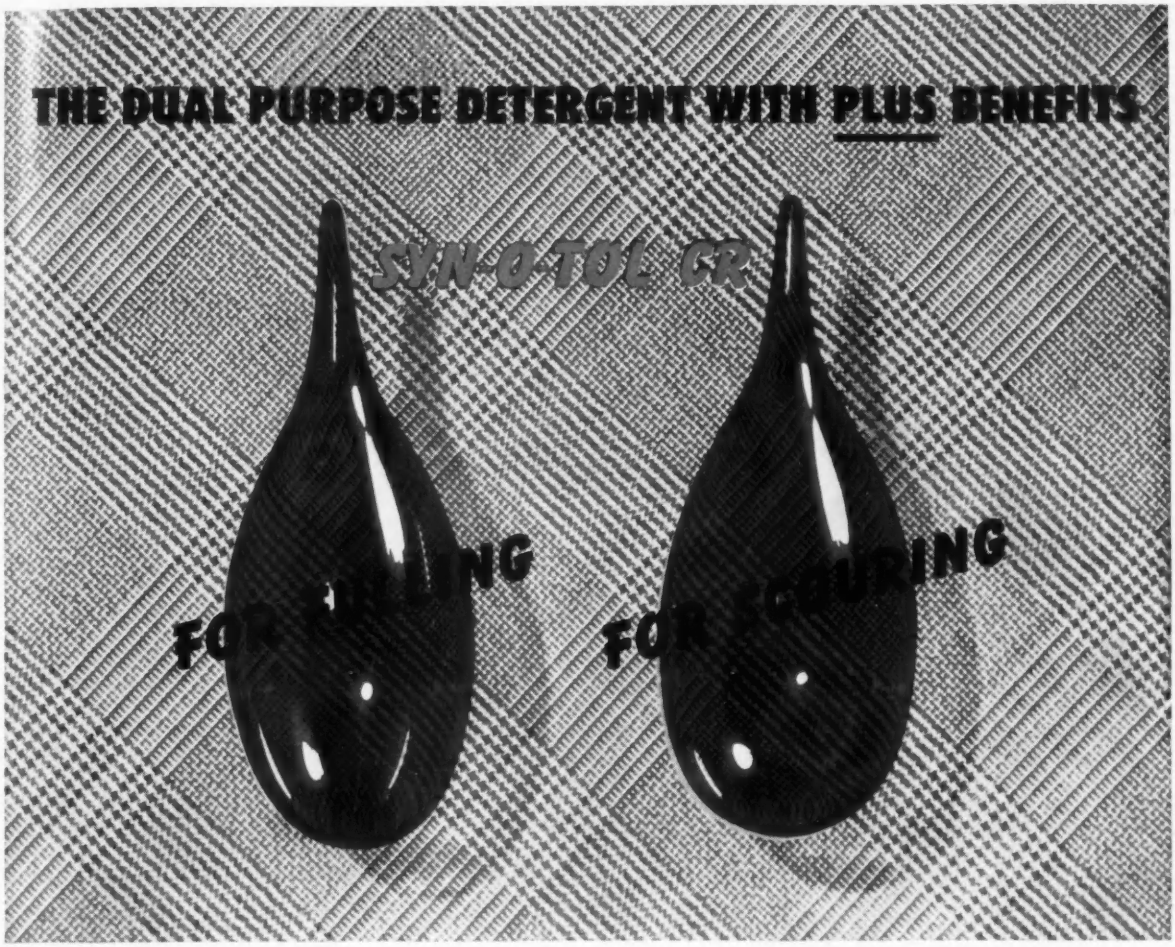
The **LIXATE*** *Process*

FOR MAKING BRINE

*REG U. S. PAT OFF.

INTERNATIONAL SALT COMPANY, INC., Scranton, Pa.



SYN-O-TOL CR is not only highly efficient as a scouring agent, it is equally effective in the fulling operation. When used in fulling, SYN-O-TOL CR substantially reduces soap usage, produces cleaner goods, and assures level dyeing. Here are its advantages:

For Fulling Woolen and Worsted Piece Goods

- Activates soap so efficiently that less soap is required to give same cover etc., on finished goods.
- Increase rinsibility of soap, etc.
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- Instantly and evenly wets cotton warp fabrics etc., in the fulling mill.

For Scouring Wools and Man-made Fibers

- Has excellent suspending and "staying" power.
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SYN-O-TOL CR IS MORE ECONOMICAL THAN SOAP WHEN USED WITH ALKALI

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BY THE OFFICIAL PUBLICATION, A.A.T.C.C. TO MANUFACTURERS OF PRODUCTS USED IN

TEXTILE WET PROCESSING

ISSUED IN CONNECTION WITH THE

Thirtieth Annual Convention

AMERICAN ASSOCIATION of TEXTILE CHEMISTS and COLORISTS

at

Hotel Statler New York

OCTOBER 17-18-19, 1951

The AMERICAN DYESTUFF REPORTER, the only EXCLUSIVELY WET PROCESSING publication will publish the ANNUAL A.A.T.C.C. CONVENTION ISSUE on

OCTOBER 1st, 1951

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Advertising copy in this issue should be factual and complete.

A number of exhibitors are now preparing copy for two facing pages to permit the use of both photographs of facilities as well as complete listings of all products available.

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AUGUST 20, 1951
VOLUME 40 NUMBER 17

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Proceedings of the
American Association of Textile Chemists and Colorists

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AUGUST 20, 1951

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Calendar of Future Meetings

COUNCIL: Oct 18 (Hotel Statler, N Y); Nov 16 (Hotel New Yorker); Jan 18, 1952; April 18, 1952; June 20, 1952; Sept 19, 1952 (all in New York); Nov 6, 1952 (Boston).

GENERAL RESEARCH COMMITTEE: Sept 28 (Swiss Chalet, Rochelle Park, N J). Other dates and sites are the same as the Council's.

NATIONAL CONVENTIONS: 1951—October 17-19, Hotel Statler, New York, N Y; 1952—November 6-8, Boston, Mass; 1953—Sept 17-19, Hotel Stevens, Chicago, Ill; 1954—Atlanta, Ga.

HUDSON-MOHAWK SECTION: Sept 21 (Jack's Restaurant, Albany); Oct 26 (Hotel Utica, Utica N Y); Dec. 7, Feb 1, 1952, Mar 21, 1952, May 2, 1952 (all at Jack's Restaurant); June 20, 1952 (Annual Outing).

MID-WEST SECTION: Sept 29 (Morrison Hotel, Chicago, Ill.)

NEW YORK SECTION: Sept 28 (Swiss Chalet, Rochelle Park, N J); Nov 30 (Swiss Chalet); Jan 11 (Hotel New Yorker); Feb 29 (Hotel McAlpin, New York); April 18 (Swiss Chalet); May 16 (Swiss Chalet); June 20 (Outing).

NORTHERN NEW ENGLAND SECTION: Oct 26 (LTI, Lowell, Mass); Nov 30 (Annual Meeting, Boston, Mass).

PACIFIC SOUTHWEST SECTION: Oct 6 (Annual Outing, Ojai Valley Inn, Ojai, Cal); Jan 11, 1952; March 28, 1952.

PHILADELPHIA SECTION: Sept 14, Oct 26, Dec 7, Jan 18, 1952 (all at Kugler's Restaurant, Philadelphia).

PIEDMONT SECTION: Sept 22 (Annual Meeting, Charlotte, N C).

RHODE ISLAND SECTION: Oct 26 (Providence Engineering Society; Nov 16 (Johnston's).

SOUTH CENTRAL SECTION: August 24-25 (Outing); Dec 1 (Hotel Patten).

SOUTHEASTERN SECTION: Sept 8 (Columbus, Ga); Dec 8 (La Grange, Ga).

WESTERN NEW ENGLAND SECTION: Sept 28, Nov 9, Dec 14 (all at Rapp's Restaurant, Shelton, Conn).

EXHIBITORS AT NATIONAL CONVENTION

THE largest exhibit to date will feature the 30th National Convention of AATCC to be held at the Hotel Statler, New York, October 17-18-19. The Exposition will be a most important activity of the Convention and manufacturers are sparing no effort to make their displays informative and attractive. The Fiber and Fabric Section, complementing the theme of the Symposium Luncheon on mixed fibers, will stress technical information and service in the dyeing and finishing of synthetics and blends.

Many plant groups will enjoy, and benefit by, a tour of the exhibits. It is suggested that parties be formed to visit the show, particularly in the evening hours. Textile student groups, with leaders, are also invited to attend. Show hours are as follows:

Wednesday, October 17—10 am to 10 pm

Thursday, October 18—10 am to 10 pm

Friday, October 19—10 am to 5 pm

Department A of the exhibit area is located on the 18th floor of the Statler (Penn Top and Foyer); Departments B and C are located on the Mezzanine Floor (Georgian Room and Foyer, Parlor C, Rotunda, Parlors 1 and 2).

The exhibitors:

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The Brush Development Co, Cleveland
Burlington Engineering Company, Inc, Graham
Calco Chemical Division, American Cyanamid Co, New York
Carbic Color & Chemical Co, New York
Ciba Company, Inc, New York
Commonwealth Color & Chemical Co, Bronx
The Cravenette Co, U S A, Hoboken
Dexter Chemical Corporation, Bronx
Dow Corning Corp, Midland
E F Drew & Company, Inc, New York
E I du Pont de Nemours & Co, Wilmington
Emery Industries, Inc, Cincinnati
Fairchild Publications, New York
Fisher Scientific Company, Eimer & Amend Div, New York
Gaston County Dyeing Machine Co, Stanley
Geigy Company, Inc, New York
General Dyestuff Corp, New York
David Gessner Co, Worcester
Glasco Equipment Corp, Paterson
John Hewson Co, New York
Hilton Davis Chemical Co, Cincinnati
E F Houghton & Co, Philadelphia
Instrument Development Laboratories, Needham Heights
Textile Colors Division, Interchemical Corp, Hawthorne
Kelco Company, New York
Macbeth Corporation, Newburgh
Monsanto Chemical Co, St Louis
Morrison Machine Co, Paterson
National Aniline Division, Allied Chemical & Dye Corp, New York
National Milling & Chemical Co, Philadelphia
National Starch Products, Inc, New York
Nopco Chemical Co, Harrison
Nuodex Products, Inc, Elizabeth
Onyx Oil & Chemical Co, Jersey City
Pharma Chemical Corp, New York
Rayon and Synthetic Textiles, New York
Richmond Oil, Soap & Chemical Co, Inc, Philadelphia
Rohm & Haas Company, Philadelphia
Royce Chemical Co, Carlton Hill
Sandoz Chemical Works, Inc, New York
Sarco Company, Inc, New York
Scholler Bros, Inc, Philadelphia
Seydel-Woolley Company, Atlanta
Alexander Smith Products, Yonkers
Smith, Drum & Co, Philadelphia
Socony-Vacuum Company, Inc, New York
South Florida Test Service, Miami
Standard Fabricators, Inc, Bronx
Tenco Machine Company, Paterson
Tennessee Eastman Corp, New York
Textile Age, Greenwich
Textile Bulletin, Charlotte
Textile Industries, Atlanta
Textile World, New York
U S Testing Co, Hoboken
Venango Engineering Company, Philadelphia
Virginia Smelting Company, West Norfolk
Wallerstein Company, Inc, New York
Warwick Chemical Division, Sun Chemical Corp, Long Island City
Westinghouse Electric Corp, Mansfield
Jacques Wolf & Co, Passaic
Wyandotte Chemical Corp, Wyandotte

DEPARTMENT B—FIBERS AND FABRICS

Joseph Bancroft & Sons Co, Wilmington
Celanese Corporation of America, New York
E I du Pont de Nemours & Co, Inc, Wilmington
Italviscosa, New York
Owens Corning Fiberglas Corp, New York
Carbide & Carbon Chemical Div, Union Carbide & Carbon Corp, New York
Virginia-Carolina Chemical Co, Richmond
American Bemberg Corp, New York

The committee for exhibits consists of Henry L Young, *Chairman,* C W Bendigo, J B Goldberg, Otto C Haufe, Thomas F O'Brien, Myron D Reeser, Albert J Royce, Sr, and Francis S Richardson. Exhibit manager is Charles W Strong of Campbell-Fairbanks, Inc.

Complete descriptions of all exhibits, together with floor plans, will appear in the Convention Issue of the Reporter, October 1st.

Northern New England Section——

DETERGENTS — A DILEMMA*

SIDNEY M EDELSTEIN
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INTRODUCTION

SEVERAL years ago I had the pleasure of speaking to you as a collector of old books. Tonight I appear again as a collector, but this time as a collector of questions and answers on detergents.

Many of the questions that I have collected are old but hardly rare. Many are fresh and new. I have found some at out-of-the-way discussions, but most have been picked up at meetings and forums on detergents.

Tonight I wish to present to you some of the most important questions in my collection, and their answers. The questions indicate that, for many, detergents are a real dilemma. The answers indicate the solution to this dilemma.

I. *What is a detergent?*

Suprisingly enough, the word *detergent*, which is so widely used in the technical literature, in the press and on the radio, does not have a single exact meaning for everyone.

The dictionary says that a *detergent* is something which cleans, or which purges away. Under this definition, my wife's vacuum cleaner, the garden spray, acids and alkalis, as well as soap and soap-like materials, can all be called detergents.

I believe, however, that for our purpose as textile chemists, we can agree that the word *detergent* means a substance which, when dissolved in water in small amounts, improves the cleaning properties of the water by a physico-chemical effect rather than by a straight chemical or straight physical effect. Obviously, this definition includes soap as well as the so-called synthetic detergents.

Now, there is no more reason to call a fatty amide condensate a synthetic detergent than to call soap a synthetic detergent. Both are artificially made by chemical processes and are built mainly from fatty raw materials. Nevertheless, there has come into the trade a certain understanding as to the use of the term *detergent* in contradistinction to the term *synthetic detergent*. The word *detergent* means all of the detergents fitting in with our above-mentioned definition, including soap. *Synthetic detergent* has come to mean all of the detergents fitting in with our definition and which are made by chemical means, but excepting soap. Therefore, when we speak of detergents, and the action of detergents, and the properties of detergents, we are speaking of soap as well as of the synthetic materials. If we wish to exclude soap, we say "synthetic detergents."

Sidney Edelstein

A former research textile chemist turned manufacturer of chemical specialties uses the question-and-answer method to discuss the different classes of detergents, including soaps and detergents, from the viewpoints of chemical composition, ionic behavior, testing, and selection for use in textile processing. He especially emphasizes that laboratory tests alone are not adequate to determine which product is best for a particular mill use and that no one product can be best for all purposes. His advice is that products first be selected for trial from a consideration of chemical composition and reputation for a particular kind of work and then that the final decision with respect to the choice of a detergent depend upon carefully planned and controlled mill trials of performance.

II. *How does a detergent work?*

This question has been asked numerous times, and whether the answer is given by an expert, by a scientist, or by a practical man, the answer must, to a certain extent, be evasive. No one really knows, completely, how a detergent does its work. The factors involved are so complex that they cannot be completely evaluated. The types of soils and dirts, the variety of fabrics and surfaces that may be cleaned with a detergent are almost infinite, and each type of soil, each type of surface, affects these factors in its own particular way.

There are certain fundamental actions which do seem to take place in a detergency operation, and these have been fairly well agreed upon.

First, wetting. Obviously the detergent must cause the liquid to wet, or to come in intimate contact with the dirt, with the surface that is to be cleaned, and, generally, with the air that is held by the surface.

Secondly, the detergent must cause the liquid to separate the particles of dirt from the soiled surface, and then these particles must be suspended or emulsified.

Thirdly, in a detergency operation there must generally be a deflocculation action, or electrical attraction for the dirt particles by the detergent solution, so that the dirt is not redeposited on the surface being cleaned. Fourth, often some chemical action is a factor in detergency operations, but generally this is a minor factor.

To discuss these factors in any more detail would be to no avail, for even after listening to hours and hours of arguments and discussions on the action of a detergent, or a detergent solution, the only conclusions that would be reached would be that the detergent solution must wet the dirty surface, it must separate the particles, and then it must suspend the dirt particles, and keep them from going back on the fabric.

III. *Is the problem of washing dirty clothes and scouring textiles the same?*

I believe many of us have found out, with a bit of chagrin, that the answer to this is a big, "No". I wonder how many of us have taken home the synthetic detergent, which has worked so well in our mill, in scouring a particular type of fabric, and have proudly presented it to our wife with the suggestion that she try it in the washing machine. I am sure that we have all felt a bit ashamed, and have wondered just what was what, when junior's overalls seemed just about as dirty after washing with that new wonderful material as it did before it went into the machine.

The problems in laundering and in textile scouring are for the most part completely different.

* Presented before the Northern New England Section in Cambridge, Mass on January 26, 1951.

In scouring most dirty clothes, we generally encounter an abundance of dry dirt. Grease and fatty matter are usually imbedded in the dirt. In most textile processing operations we find the reverse to be true. Rarely is it required to remove dry dirt. In most cases, the scouring operations involve the removal of oils and oily materials. Generally dirt is suspended in the oil or fat.

Now, perhaps the biggest factor in the difference between the action of a good detergent in a textile operation, as against a good detergent in a laundry operation, is related to the suspending and deflocculating properties of the detergent. For example, there's no question of the satisfactory scouring properties of many alkylarylsulfonates in textile operations. In laundering, however, they are very poor, unless materials that improve the suspending action of the detergent are added in large quantities. Apparently, in laundering operations it is necessary not only to remove the various types of dirt, but to keep this dirt suspended and thus to prevent it from redepositing on the cleaned surface.

IV. *What properties must a good textile detergent have?*

The obvious answer is that a good textile detergent must have the properties that are necessary to do the job at hand. Since the job at hand may vary from such things as scouring light acetate fabrics to scouring dirty wool, no general properties can be given. Obviously, there are many properties, which, while necessary for one particular operation, might be harmful for another.

Suppose, for example, we are scouring a light-weight acetate fabric. Here, high alkalinity in a detergent would be undesirable, yet if we were to scour a very heavy cotton fabric containing a large amount of grease, the high alkalinity would be considered desirable, and, in fact, perhaps necessary.

Take for example, the matter of substantivity: a detergent that is highly substantive to proteins might be perfectly satisfactory in scouring cotton but might prove too expensive in scouring wool because of its rapid exhaustion from the bath.

What about hard water? Is dye leveling necessary? Is the detergent to be used in the presence of salts? Is the fabric one that is difficult to wet, or is wetting no problem? Obviously, in trying to answer our question we have only asked a lot of questions, and we come back to where we started. Again we say, "A good textile detergent must have the properties that are necessary to do the job at hand."

V. *What is the difference between anionic, cationic, and nonionic detergents?*

This question is always asked at detergency forums, and, if not asked, it is at least always discussed by the speaker. In answering the chemical or theoretical side of this question, the speaker can always bring forth diagrams; he can use such words as hydrophobic, hydrophilic, carbon residues and electric charges. In fact, he can talk on this complex subject for hours. But it always seems that at the end of the discussion, those who already knew the difference between anionic, cationic, and nonionic detergents are a little less sure of their information, and those who didn't understand the involved chemistry are still confused.

I believe for our purpose we can say that anionic detergents are those which, when dissolved in water, divide up into particles having positive and negative charges with the heavy part or working part, of the molecule showing a negative charge in solution. The anionic detergents, as a class, include the bulk of the detergents being used today in textile processing.

The cationic detergents are those detergents which, when dissolved in water, also split into particles having positive and negative charges with the working part of the molecule having a positive charge; however, cationic detergents are little used in the textile industry for detergency problems, and are known to us mostly as softeners.

The nonionic detergents are those detergents which, when dissolved in water, do not split up into positively and negatively charged particles. The nonionic detergents are characterized by resistance to precipitation by salts, acids, alkalies, and ionic detergents.

VI. *What are the differences between the main anionic detergents?*

There is no completely satisfactory system for classifying the various anionic detergents. Generally, however, most chemists prefer to differentiate the anionic detergents on the basis of the solubilizing group. The first important anionic detergents are those in which the solubilizing group is a carboxylic acid radical. For all practical purposes, this means the soaps. The soaps, in general, are characterized by good cleaning and scouring properties when used on the alkaline side. Their obvious disadvantage, of course, is the fact that they are not satisfactory in the presence of hard water or in the presence of acids and salts.

The next important class of anionic detergents may be classified broadly as sulfuric esters. The sulfuric esters are subdivided into three distinct groups, each of which has its own characteristics. The first sub-group under the head of sulfuric esters is that of the sulfated fatty alcohols. These products are characterized by good foaming properties in acid or alkaline solution, by good resistance to salts and generally by good wetting properties. These materials also generally leave the goods quite soft.

The second subgroup is that of the sulfated amides which are widely known and used. The sulfated amides are excellent foaming agents, have very high wetting properties, and are very similar in many of their properties to the sulfated fatty alcohols. The third subgroup among the sulfuric esters is that of the sulfated esters, which, while similar in their properties to the sulfated alcohols and the sulfated amides, are not as widely used in the textile industry as either of the two other products.

The third large main group of anionic detergents contains the alkane sulfonic acids. The most important among these are those in which the sulfonic group is hooked on through an amide linkage. These products are similar in many ways to the corresponding sulfuric ester products in wetting and in detergency. However, they do show a higher stability to extreme acid conditions. Those with the sulfonic groups joined through an ester linkage are of somewhat less importance.

Finally, we have what is probably the largest group among the synthetic anionic detergents in terms of tonnage. These are the alkylarylsulfonates. While theoretically there are many possible structural variations for this type of product, for the most part we find that the alkylarylsulfonates in use as detergents today consist generally of a benzene or toluene nucleus to which a sulfonic acid group and a long-chain aliphatic group are attached. Most often, the aliphatic groups are derived from the kerosene fractions of petroleum. The alkylarylsulfonates are characterized, in general, by low unit cost. These products have good wetting properties but poor dirt-suspending and deflocculation properties.

VII. *Can detergents be evaluated by chemical analysis?*

If we mean by this question, "Can we tell whether one detergent will do a particular job better than another by determining the active ingredient content," the answer is "No". If we mean by this, "Will the complete analysis of two detergents tell us which is the better money value for our particular process," then the answer is "No". If we mean, however, "Can a chemical analysis serve as a guide to the general properties of a detergent," the answer is "Yes".

In examining these statements, let us take the matter of active ingredient first. I wonder how many detergent salesmen have had their product either bought or rejected on the basis of the amount of active ingredient his product contained, or on the unit cost of the active ingredient. Generally such a basis is economically wrong. Let us take the example of a typical

alkylarylsulfonate as compared against a typical sulfated fatty amide. At an equal selling price it will generally be found that the alkylarylsulfonate will contain about twice the amount of active ingredient as will the sulfated amide. On a performance basis, however, the two may be equal in certain operations and, in fact, in some scouring operations the sulfated amide, which contains much less active material, may do a better scouring job than the other product containing a greater amount of material. Obviously, the determination of the impurities, SO_3, ash and water, also fall into the same category as the determination of the active ingredient. All of these determinations, however, are of use in certain particular cases.

If we are dealing with one specific type of detergent, as for example, a sulfated fatty amide, and we wish to evaluate it against another sulfated fatty amide, the determination of the active-ingredient content of both products, as well as the determination of the type of impurities, will give a measure of the relative value of the two products. In addition, the type of impurity, or builder, may indicate certain specific properties. Finally, the SO_3 content together with the other constants may indicate how carefully compounded and prepared each of the products is.

Now, what about using chemical information for determining the possible value, or use, of a detergent in our particular operation. The chemical constants can indicate the chemical structure of the compound. This information, coupled with our own experience with many compounds, should tell us what we may expect as to the compound's resistance to acids and alkalies, its substantivity, and a host of other properties. But again we must say that no chemical analysis can evaluate one detergent against another, either from the efficiency standpoint, or from the dollar and cents standpoint, unless we compare two detergents of exactly the same chemical structure.

VIII. *Can detergents be evaluated by surface-tension measurements or by other physical tests on their solutions?*

I wonder how many of us have on occasion read a particular bit of technical data on a new detergent, which showed that this new detergent lowers the surface tension of water to a much greater extent than does the type of detergent that we were presently using, and have tried this detergent with the low surface-tension measurements in the plant, only to find that we didn't get any wetting action or scouring action or any useful results at all. The reason for such results is quite simple. Surface-tension measurements are in no way a measurement of the detergency powers of a particular detergent. As a corollary, we can say that there is no direct relationship between the ability of a detergent to lower the surface tension of water and its ability to cause that water to clean.

Such methods as the measurement of interfacial tension between other surfaces and the measurement of dispersing power for umber, iron and silica have also been proposed as means for testing detergents. In no cases have any of these particular physical testing methods been able to predict the performance properties of a detergent. On theoretical grounds alone there is no reason to believe that any such test can ever be used to indicate the performance of a detergent.

IX. *Will wetting tests evaluate detergents?*

Wetting tests, so far, are not able to even evaluate wetting agents except in very narrow specific cases. How can we then expect such tests to evaluate detergents?

Wetting in itself is certainly an attribute of a detergent. In most cases it is desirable that the detergent have a reasonable amount of wetting power. As to whether the wetting power is very rapid or slow may, or may not, be of importance.

The wetting tests that are used today are based on the time of sinking of cotton yarn, cotton tape, or cotton fabric in a solution of the agent being tested. It has been shown that with all tests so far put forward the wetting properties of two agents can only be compared accurately when they are of exact chemical nature. Obviously then, wetting tests can only be used for very rough comparisons of wetting in most cases. Since wetting is only one desirable attribute of a detergent, it is completely erroneous to measure the efficiency of a detergent by any type of wetting tests whatsoever.

Wetting tests can be of use with detergents, however, when they are used as a means of control. For example, it is possible to set up wetting curves for a particular detergent being used in the plant, and then to use wetting tests to determine the concentration of the detergent in the bath at any time. Uses for any other purpose may be completely misleading.

X. *Can the money value of a detergent be obtained by standard-soil-cloth detergency tests?*

The tests about which questions have been asked so far are all concerned with specific properties of a detergent. Surely, if we could measure the actual detergency, or cleaning value, of a detergent under some set of controlled conditions, then, most of us must feel that actual evaluations between detergents could be made and their money value obtained.

The mere fact, however, that the types of surfaces which must be cleaned and the types of soils which must be removed are so varied precludes the possibility of any single standard soiled cloth or soiled surface being used to give an exact measure of the detergency powers of a detergent.

Many laboratories and research organizations have developed, and are using, artificially soiled cloths. For the most part, these soiled cloths contain mixtures of mineral oil, lamp black, hydrogenated vegetable oil, gums and other materials. Even in the preparation of such fabrics the problem of making a soiled fabric which will remain standard under long conditions of storage and which can be reproduced from time to time has proven difficult.

Notwithstanding this problem, we must remember that in textile processing not only are there differences in the type of dirt which must be removed, but we have the problem of removing dirt from such fibers as cotton, wool, rayon, nylon, and mixtures of these and other fibers. The mechanical surfaces themselves, the type of weave, the type of machine on which the fabrics are scoured, the temperatures, the time of contact and many other factors obviously affect the results. How can a single soiled fabric or any reasonable groups of standard soiled fabrics be equivalent to all the soiled fabrics encountered in production? In addition, the detergency tests on these standard soiled fabrics are usually carried out in a machine such as a Launder-Ometer. The factors of water-to-goods ratio, temperature, and mechanical action are obviously very different in these laboratory machines from those encountered in the plant.

It has been found by many workers, and probably by most of you, that, with one particular soiled fabric and the usual type of Launder-Ometer tests, one detergent may show up much better than another, but with another type of soiled fabric the reverse may be true. Also, when an attempt is made to relate any of these laboratory detergency tests to actual practice, rarely do they agree with what may be found. The answer to this must be, and the consensus among practical men is, that the money value of a detergent cannot be obtained by standard-soiled-cloth detergency tests.

XI. *Can laboratory tests be developed to evaluate detergents for use in a specific plant operation?*

The work of several here tonight who are members of one of the detergency committees working at Lowell has certainly shown that the answer to this question is a big, "Yes."

It is obvious that to evaluate a detergent in the laboratory for a particular

plant operation, we must set up in the laboratory, as closely as possible, the conditions under which the detergent will be used in the plant. Such conditions as water-to-goods ratio, mechanical action, time of contact with detergent solution, rinsing, type of fabric, and many other things all must be taken into account.

Let us take the problem of evaluating a detergent for the scouring of raw wool. There is no problem in obtaining a reasonable supply of the raw wool which will be treated in the plant. To duplicate, however, the actual conditions whereby the raw wool is agitated and kept in the different bowls for particular lengths of time and then rinsed under particular conditions is obviously a problem which is difficult to set up in the laboratory. It can be done, and has been done, by what amounts to a miniature scouring train. Whether the bowls consist of glass tanks or of wooden tanks is not of importance. The time sequence, the temperature, and the other factors are of the essence.

Let us take as the other extreme the use of detergents in scouring out skeins of cotton yarn. In evaluating detergents for this process, it is not too difficult to set up in the laboratory very quickly and easily conditions of temperature, time and agitation, closely related to that which would be obtained in the plant. Many other specific operations, such as soaping off vats and naphthols, scouring rayon and cotton in rope form, and many operations where detergents are required, can be simulated in the laboratory with fairly simple equipment. In this, the careful evaluation of the factors involved and the decision as to which factors are important and which are not is something which calls on the ingenuity of the technician. This type of evaluation has proven much more practical than chemical analysis, wetting tests, or standard-soiled-cloth detergency tests.

XII. *What is the effect of builders on detergents?*

By *builders* we mean inorganic salts that enhance the activity of detergents in some manner. It has long been known that many alkaline salts, such as borates, phosphates, silicates and carbonates, help the detergent action of soaps. More recently it has been found that these builders, when used with many of the synthetic detergents, also greatly enhance the effect of these detergents. With certain detergents, even ordinary neutral salts, such as sodium sulfate and sodium chloride, have also been found to be of value.

The use of builders has become of great importance with many of the newer synthetic detergents, not only for household laundering, but for many of the commercial detergency operations encountered in the textile plant.

In many cases a combination of a synthetic detergent and a builder may be more effective for a particular operation than the synthetic detergent alone. The fact is that these builders, which many people formerly considered as diluents, are in many cases more important than a higher content of active ingredient. This should again point out that a detergent, whether a pure chemical compound or a combination of an organic detergent and inorganic builders, should be examined for its ability to do the job, and not for its actual chemical content alone.

XIII. *Are sequestering agents useful with synthetic detergents or only with soaps?*

The terms *builders* and *sequestering agents* have often been confused. Perhaps the reason for this confusion is the fact that certain builders that have been used with soaps as well as with synthetic detergents also have sequestering powers. By *sequestering powers,* we mean the ability to form complex ions with metallic ions and thus to prevent these metallic ions from taking part in their normal chemical reactions. Thus calcium or magnesium properly sequestered will not form insoluble calcium or magnesium soaps.

The need for a sequestering agent with soap is obvious. Soap has always had the disadvantage of forming insoluble metallic soaps, which in textile processing and in laundering would not only use up the soap, but, in addition, would cause sticky, harmful deposits which might cause trouble in dyeing and finishing. Upon the introduction of the synthetic detergents, however, it was assumed that sequestering agents would be of no value with these products since these detergents do not generally precipitate or show reduced foaming in the presence of metallic ions. It was soon realized, however, that, while foaming may not be affected and while the metals form soluble compounds, the detergency properties of the synthetic detergents could be greatly improved in hard water by the addition of sequestering agents.

Today the use of sequestering agents has its place with synthetic detergents just as much as it does with soaps. The availability of many new types of sequestering agents indicates possible new uses for synthetic detergents as well as for soaps.

XIV. *What about CMC?*

At the end of the last world war technical reports out of Germany showed that the sodium salt of carboxy methyl cellulose, that is to say CMC, had been intensively studied by the Germans and used as a detergent builder during the war. The Germans claimed that CMC was able to replace two or three times its weight of soap when used as a soap extender. The Germans also claimed that they had found the addition of CMC to be remarkably effective in improving the detergency of the anionic sulfonates and sulfates for soiled cotton goods. The Germans pointed out that they considered the action of CMC to be primarily that of a protective colloid, and that the product was particularly effective in preventing the re-deposition of dirt onto cotton fabrics when washed with mixtures of anionic detergents and CMC.

The work of the Germans has been to a great degree borne out in this country, and we find a greatly increased production of CMC by many companies. Actually, however, we find that the main use of CMC with detergents is in the manufacture of household detergents based on the alkylarylsulfonates derived from petroleum. The alkylarylsulfonates are particularly notorious in their poor washing qualities on dirty cotton, and the addition of CMC improves these washing qualities greatly.

So far in textile processing, the use of CMC with detergents has been little indicated and little used. In fact, there is a general consensus that CMC is of little or no importance at the present time either for direct use in the plant to aid detergent solutions or as an additive or builder in detergents being sold to the textile industry.

XV. *How important is foaming in a textile detergent?*

Perhaps the most effective and direct answer to this question is a statement from a recent book on detergents, which says that, "possibly the most widely held wrong idea regarding detergents, is that detergency is directly related to foaming power."

If this is so, why then is good foaming so often desired in a detergent? In fact, I am sure that there are many dyers and finishers who look with suspicion on any detergency operation in which there isn't a good foam present.

The original basis for assuming that lack of foam in a detergent indicated poor detergency had a sound basis when the only detergent available was soap. If any lime or magnesium salts were present with soap, or if the water were acid, or if there were a high concentration of salt, such as in sea water, no foam would be present, and no washing results could be obtained with soap. Therefore, foaming and detergency became associated. With the development of synthetic detergents, however, the idea that high foam indicates good detergency still presists even though many of the synthetic detergents would show high foaming action even when poor detergency is being obtained. The introduction of

detergents that show very little or no foam have thus met with a considerable amount of difficulty, perhaps much more so in the household field than in the case of textile operations.

The physicochemical factors involved in foam formation are too complex to discuss here; but suffice it to say that the ability to form high foam is related essentially to certain surface-tension relationships with respect to air and is not at all related to the ability of a detergent to remove a soil or dirt from a surface.

While in certain isolated cases foam may be desirable, in most operations the presence of foam is only a disadvantage, which may interfere with the proper operation of the machinery at high speeds.

XVI. *What is the place of detergent blends and detergent specialties in textile processing?*

The fact that the detergency operations involved in textile operations are so complex, the fact that many types of fibers or blends must be scoured or cleaned, and, finally, the fact that no single detergent has all the properties that would suit it for all operations has led to the development of detergent blends and detergent specialties. In fact, the great complexity of the detergent problem in textile processing has built a sound place for the companies making detergent specialties and detergent blends.

We have already seen that the addition of builders, the addition of CMC, and the addition of sequestering agents actually improve the properties of a detergent. We find even another unusual condition in many cases, and that is that the blending of two types of detergents will in many cases enhance the properties of either detergent. This is due to what is called a synergistic effect.

It is thus possible to combine one detergent having good wetting properties with another detergent having good emulsifying and suspending properties to obtain a final detergent mixture which has all three of these properties greatly improved. In addition, we find the possibility of obtaining either high or low foaming effects, good grease and dirt removal, low exhaustion, and many special properties by a combination of several detergents.

As a further extension of this type of blending, we find that many detergents, because of their lack of some one or two properties, can be greatly improved by the addition of nondetergent materials, which are neither builders nor sequestering agents. For example, in certain processing operations it may be necessary to remove large quantities of grease and oily dirt from a fabric. By the addition of selected solvents to a detergent, it is often possible to prepare a compounded or specialty product which will remove the grease and dirt more easily and more cheaply than would the detergent alone in any concentration used. This idea can be expanded greatly.

The use of compounded detergents and specialty detergent blends has been increasing greatly, and their use will undoubtedly continue to increase as the processing problems involving detergency increase in number and complexity.

XVII. *Is the use of synthetic detergents creating a new problem in waste disposal and stream pollution?*

This question has been coming up with increasing intensity within the last few years at various meetings and detergency panels. The problem created by the use of synthetic detergents in textile processing, as far as waste disposal and stream pollution is concerned, is not yet a great one, but it may become acute in particular localities.

The most important factor in this problem is that, in contradistinction to soap, low concentrations of many synthetic detergents have a strong emulsifying power for many substances. Now, when soap was the detergent, the emulsifying power of the soap could be easily upset by hard water, salts, or acids when the waste liquors were brought into a waste disposal plant or allowed to flow into a stream. But, in the case of synthetic detergents, the reverse is true, and there remains the problem of destroying the strong suspending powers of synthetic detergents in the waste liquors from plants.

Another factor to be considered, and which has come up on occasion, is the fact that the presence of synthetic detergents in minute quantity in certain streams has been found to have an affect on plant and animal life. Detergents generally have a certain amount of wetting power, and the fact that these detergents are not precipitated or broken up has in many cases enabled poisonous materials in natural waters to affect plant or animal life more easily. So far no real answer to this problem is at hand, but one will undoubtedly be found if it becomes of increasing importance.

XVIII. *Do the detergents used in scouring a textile fabric have an effect on the final strength and hand of the fabric?*

The answer to this is "Yes", or "No", depending on the detergent and the fabric. In many operations the type of detergent used will have an important effect on both the hand and the tensile strength of the fabric. In certain well defined cases this is well known, but in many others it is not.

For example, let us take the case of acetate fabrics. We are all quite familiar with the fact that it is not too difficult to saponify acetate with alkali, and that this saponification changes the hand, elasticity, and tensile strength of the fabric. Obviously, the choice of a detergent in connection with acetates is of considerable importance, and this choice affects the final hand and strength of the fabric.

If we take another sensitive fiber, such as wool, we find the same thing can be true. We are all quite familiar with the fact that wool is sensitive to alkali and many of the operations involving wool fibers are best carried on with detergents which contain little or no alkali. In addition, we find that wool has a high substantivity for many synthetic detergents. The actual exhaustion of detergents onto the wool will accordingly affect the final hand.

In addition we have many intermediate conditions. In the case of cellulosic fibers, the effect of detergents on the tensile strength normally is not considered of importance, but, in the case of hand, some of the newer developments are important. Today it is possible to furnish synthetic detergents containing materials that are substanative to the cellulose of the cotton or rayon. During the washing procedure the substantive agent is drawn out of the bath and is strongly held by the cotton or rayon, thus protecting the fabric from chafe marks and furnishing a soft final hand. Apparently materials of this type, which are really blends of regular anionic detergents with certain completely new substantive softening agents, will have an increasing use in the future.

XIX. *Is there one best textile detergent?*

On a number of occasions at various open discussions concerning detergents, some member of the audience has arisen and put forward this question, "If we could obtain only one single detergent, what kind would we choose"? The answers to this have been so varied that only a few can be mentioned.

Generally, an old line dyer or finisher would arise and say, "Well if I had my choice, give me old fashioned soap. I know I could get a good scouring job with this, and if I had hard water I could always do something about it."

Then there would usually come an answer from one of the younger men who would say, "No, if I had my choice the safest thing would be a nonionic detergent. With a nonionic detergent I wouldn't have to worry about acid or alkali or hard waters or precipitation with dyestuffs. If I wanted to mix in any type of material with it, whether cationic or anionic, I could get along."

(Concluded on Page P535)

Philadelphia Section———

SOME ASPECTS OF THE CHEMICAL FINISHING OF FABRICS DERIVED FROM SYNTHETIC FIBERS*

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INTRODUCTION

When textile fibers have been spun into yarn, the yarn has been woven into fabric, and the fabric has been prepared and dyed, the resulting textile is not necessarily ready for marketing; for nearly all textile fabrics, regardless of fiber type, possess certain inherent weaknesses or shortcomings, which tend to limit their utility or customer acceptability. Fortunately, many of these deficiencies can be overcome by the proper finishing treatment, which may be chemical, mechanical, or a combination of both. The purpose of the present paper is to discuss the chemical aspects of finishing as applied to synthetics.

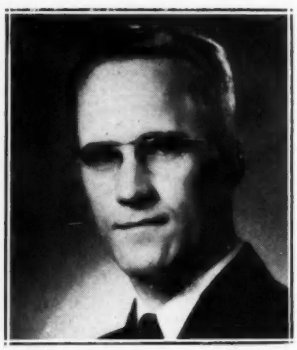
At the outset it might be well to state what we mean by finishing and what we can expect to accomplish by it. But rather than to attempt to define the term, it is better to divide finishes into a few general groups and to give examples of each group. According to one such classification, all finishes give at least one of the following three properties: increased utility, more luxurious appearance, or improvement in apparent quality.

Utility finishes are designed to impart some new and useful characteristic to the fabric, or to mask some defect that is inherent in the fiber. Examples are shrinkproofing finishes, treatment with water repellents, flame retarders, or antistatic agents.

Luxury finishes impart a more pleasing appearance or feel, and may include delustering, softening, or creaseproofing treatments.

Quality-improvement finishes are intended to impart to a lighter or thinner fabric the feel and appearance of a heavier material. Such finishes include treatments with stiffening, bodying, and weighting agents.

Now this is not intended to be an exact classification. It might be argued, for example, that creaseproofing is not a luxury but a utility finish; and that bodying and sitffening agents would detract from, rather than add to, the quality of certain sheer fabrics. Nevertheless, regardless of how we classify them, quite a variety of finishes may be obtained; and it should be apparent that there are a number of good reasons for applying a finish, apart from the obvious one of providing business for the chemical manufacturer.



A C Nuessle

Fabrics after being woven must ordinarily receive a finishing treatment, which modifies their properties to give them greater utility, better appearance, or better apparent quality. In the present paper the author discusses primarily the use of chemical finishes on fabrics manufactured from synthetic fibers.

Chemical finishes for fabrics may be classified from the viewpoint of the place of deposition, that is, in the fibers or on the surface of the fibers of a fabric. They may further be classified as to whether or not they modify fibers chemically or merely change the nature of the fabric by deposition of an adherent substance in or on the fibers.

Chemical finishes are also considered for different types of fibers from the viewpoint of the effects desired. These effects include stiffening, shrinkproofing, glazing, creaseproofing, static resisting, and softening. Certain other finishing effects grouped together under the term "proofing" by the author include water repellency, flame retardancy and mildew resistance.

In his discussion of the nature and use of finishes for synthetic fibers, the author places most emphasis on synthetic resins.

Let us consider for a moment the properties of the fabrics we are intending to finish. The three most important synthetics, from the standpoint of volume of use, are Rayon, Cellulose Acetate, and Nylon.†

Rayon is characterized by a very hydrophilic nature. Fabrics made from it imbibe great quantities of water, becoming very heavy while wet, and showing excessive shrinkage on drying. Rayon fabrics that are to be laundered should therefore be shrinkproofed, and those that are likely to be exposed to rainfall will benefit from a water-repellent treatment as well.

Nylon, on the other hand, is quite hydrophobic; it does not readily absorb water, and it shows negligible shrinkage. This same hydrophobic nature, however, makes it possible for static electricity to build up on Nylon, so that, for many purposes, an antistatic finish is desirable.

Acetate is intermediate between Rayon and Nylon. While its properties vary somewhat with degree of saponification, it absorbs little water and shows relatively slight shrinkage but does tend to build up a static charge. This behavior would put it in the hydrophobic group for most practical purposes.

Thus the term "synthetic fiber" covers two diverse types of materials: the hydrophilic, including viscose Rayon, cuprammonium Rayon, and such protein fibers as Lanital and Vicara; and the hydrophobic, including Acetate, Nylon, Dacron, Vinyon, Orlon, and an ever-increasing number of newer fibers.

THERMOSETTING RESINS ON RAYON

Because Rayon is so widely used and because, for many purposes, it absorbs too much water and thus exhibits poor wet strength and excessive shrinkage, it fol-

* Presented at the Meeting-in-Miniature in Philadelphia on October 28, 1950.

† Throughout this paper unregistered fiber names are capitalized, contrary to AATCC editorial policy, for more ready perception by readers who have a special interest in one fiber type.

TABLE I

RELATION BETWEEN RESIN LOCATION AND EFFECT PRODUCED ON RAYON FABRIC

	Internal (inside the fiber)	*Surface (outside the fiber)*
Durable stiffening		X
Shrinkproofing	X	X
Durable glazing and embossing	X	X
Creaseproofing	X	

TABLE II

DISTINGUISHING FEATURES OF THERMOSETTING MATERIALS

Type	*Chemical Nature*	*Dried down in glass*	*Hand on Fabric*
internal (diffusible)	I. cellulose reactants	soluble	very soft
	II. monomeric resin-formers	insoluble	soft
surface (non-diffusible)	III. polymeric resins	insoluble	stiff

lows that one of the most important finishing treatments should be the reduction of the hydrophilic nature of Rayon. Fortunately, this can readily be accomplished. The materials employed for the purpose are thermosetting resins (specifically formaldehyde resins) and, more recently, cellulose reactants. Through the use of these materials, at least four distinct effects may be achieved: (1) durable (washfast) stiffening, (2) shrinkproofing, (3) durable glazing and embossing, and (4) creaseproofing. Only two of these are directly related to the reduction in water absorption, but it is convenient to discuss all four as a group since a certain resin or reactant may impart several of the effects in a single treatment.

We must first realize that all reactants and resin-forming materials may be divided into two classes: monomeric, which can diffuse into hydrophilic fibers, and polymeric or part-polymeric, which largely remain on the surface of fibers. This is an important distinction because only surface resin can give stiffening, while only internal resin can give creaseproofing. The effects imparted by the two types are summarized in Table I.

The type of chemicals used in producing these effects may be grouped as follows:

Internal Modifiers:

I. Cellulose reactants, such as formaldehyde, glyoxal, certain modified urea-formaldehyde products, and any compounds that tend to react with cellulose rather than to form a resin. These do not yield a water-insoluble product when dried down in the absence of fabric. They impart a very soft finish because of the lack of surface resin.

II. Monomeric thermosetting resins, such as most urea-formaldehyde pastes; any urea-, melamine-, or ketone-aldehyde products that tend to form a water-insoluble resin rather than to react with cellulose. These also give a soft hand when properly applied.

Surface Resins:

III. Polymeric thermosetting resins, such as certain urea-formaldehyde syrups, acid-aged melamine resins, any resin-former that has already been polymerized so that it can no longer diffuse into the fiber. These give a stiff hand upon application to fabric.

This information is summarized in Table II.

Many commercial products, of course, are partially condensed, and therefore contain both diffusible and nondiffusible portions. It is also possible to obtain combination effects by combining materials from different groups. But to keep the discussion on a simple plane, let us consider briefly the use of single types to obtain the four effects listed in Table I.

STIFFENING—The first effect is durable stiffening. It is obvious that a surface resin (III) which cannot penetrate fibers may nevertheless penetrate yarns and bind fibers together, thus stiffening the yarn; and may also bond yarns at the crossover points, thus further stiffening a fabric. In plant operation a resin of the proper type is dissolved in water, an appropriate catalyst is added, and the fabric is padded, dried, and cured. The resulting stiffness is quite washfast, provided the resin has satisfactory adhesion to the fibers. In the case of formaldehyde resins on Rayon, the adhesion is invariably good; undoubtedly in addition to mere physical adhesion, a certain amount of chemical combination takes place between resin and cellulose.

Internal resin-formers (II), which completely penetrate rayon fibers, show no stiffening of fabric, provided precautions are taken to prevent migration of resin to the surface. These precautions include the use of a heavy squeeze, preferably on a 3-bowl padder with two dips and two nips, and drying at a low temperature, preferably with air blowing on both sides of the fabric. Cellulose reactants (I) give no stiffness since no surface resin can form.

SHRINKPROOFING — In proceeding to the second effect, shrinkproofing, it is necessary to consider why a fabric shrinks. It has been quite well established that the chief reason for this is fiber swelling: the wet fiber increases in both diameter and length; the yarn also increases in diameter, but tends to decrease in length because the twisted fibers must traverse a greater distance around the swollen yarn; and the fabric shrinks not only because of the shorter yarns but because the filling yarns must traverse a greater distance around the warp yarns, and vice versa. This picture is somewhat over-simplified, since a relaxed rayon fabric will often stretch on wetting and begin to shrink only when the moisture content has been reduced to about 40%. Nevertheless, it is generally true that a fabric exhibiting high fiber swelling shrinks, while a fabric exhibiting low fiber swelling does not shrink. That is why Rayon shrinks excessively, Acetate considerably less, and Nylon very little. It follows that, by reducing fiber swelling, we can reduce fabric shrinkage. With Rayon this can be accomplished in three ways.

Method I for reduction of Rayon-fiber swelling, the use of a difunctional cellulose reactant, gives the softest finish since no surface resin can be formed; this is also the most durable of the shrinkproofing treatments for rayon. Method II, employing a diffusible (internal) thermosetting resin, gives a somewhat heavier hand, depending on the amount of surface resin that is formed from migration. As the common thermosetting resins contain formaldehyde, some crosslinkage is bound to occur, and this may contribute to the durability and effectiveness of the treatment; but there is no evidence that actual crosslinkage must occur in order to obtain stabilization by this means. In general, however, Method II gives a less durable effect than does Method I. In Method III external resin not only forms a surface film on fibers, but bonds fibers together and bonds yarns to each other, so that considerable stiffening results. This bonding action no doubt contributes to the dimensional stabilization attained; but in most cases Method III gives less durable shrinkage control than does I or II.

In any case, resin or reactant is dissolved in water, catalyst is added, the fabric is padded, dried a little beyond finished width, cured, and afterwashed. The fabric may be under some tension up to and including the time of cure, but, during the afterwash and subsequent finishing opera-

tions, it should be kept as slack as possible.

DURABLE GLAZING—Another effect which can be obtained by the use of either surface or internal fiber treatments is that of durable glazing and embossing. Since the operation involves a mechanical treatment and therefore falls somewhat beyond the scope of the present paper, I will deal with this rather briefly. Upon being glazed, yarns are flattened to form a smooth lustrous surface. If no resin were present, the effect would not be durable to washing since the fibers would swell and the yarns would again round out. But by first applying a thermosetting resin-former, partially drying at a low temperature, then glazing and finally curing to set the resin, we obtain fibers and yarns that are no longer subject to excessive swelling in water, and the glaze withstands washing. This effect and the related embossing process where the fabric surface is pressed into a raised design are most readily applicable to cotton, which exhibits less swelling than does rayon; but, by proper choice of materials, a washfast finish can also be obtained on rayon. A combination of internal and external materials gives the greatest durability; but, in general, any chemical which imparts shrinkproofing to rayon can be employed because reduction in fiber swelling is the underlying principle in both shrinkproofing and durable calender effects.

CREASEPROOFING—The fourth type of finish that can be obtained with thermosetting resins is that of creaseproofing. In leading up to this subject, we might first consider what happens when a Rayon fiber is bent. It is assumed that long cellulose chains are put under a strain and tend to slide past each other. This would be true regardless of the type of fiber, but, in the case of cellulose, it is believed that secondary valence bonds between the hydroxyls on the opposing chains are first broken, then re-established in the new (bent) position. As a result the fiber tends to remain bent.

Now, it has been known for a long time that monomeric (diffusible) urea-formaldehyde resins impart a considerable degree of crease resistance to rayon fabric. Later, melamine-formaldehydes were introduced, and still more recently, certain cellulose reactants, which do not form resins. Fortunately, it is not necessary for practical purposes to know the exact mechanism by which a process operates, otherwise millions of yarns of creaseproofed rayon would never have been produced. Despite the considerable amount of study that has been made of the mechanism of creaseproofing, the phenomenon is still somewhat obscure. This much has been fairly well established: when cellulose fibers are treated with a difunctional cellulose reactant (I), the fiber extensibility is reduced and the elastic modulus is increased (i e, the fiber becomes stiffer and more springy), and this is almost certainly due to crosslinkage of cellulose chains, as was indicated in the discussion of shrinkage control. It has not been proved, however, that, when thermosetting resins (II) are used in place of reactants to obtain the same general fiber properties, all of the effect is due to actual primary crosslinks. I would prefer, for the time being at least, to include the possibility that creaseproofing may also be obtained by the formation of resin throughout the pores and interstices of a fiber where water would otherwise penetrate, the resin providing secondary valence linkages between the cellulose chains plus a few random primary linkages, which are helpful but not essential in obtaining a creaseproofing effect. By comparison it is evident that, in obtaining creaseproofing, we will also obtain shrinkage control. The converse is not always true because it requires a higher amount of chemical to obtain crease-resistance than to obtain shrinkproofing.

In plant practice a fabric, which should of course be properly prepared, is padded with a heavy squeeze to insure thorough penetration and then dried, cured, and washed. The fabric should be kept as slack as possible throughout processing.

While either a cellulose reactant or a monomeric resin-former is satisfactory, creaseproofing cannot be accomplished by an external resin (III). Small amounts of surface material, added along with internal material, provide body and a feeling of resistance to crumpling; but larger amounts facilitate the formation of sharp creases, which do not readily disappear with time.

THERMOSETTING RESINS ON ACETATE AND NYLON

From the foregoing it is apparent that, on Rayon, which can generally profit by chemical modification, thermosetting resins and reactants may be used to impart durable stiffness, shrinkage control, crease resistance, and durable glazing and embossing. But hydrophobic fibers, including Acetate and Nylon, while perhaps less in need of modification along certain of those lines, are also more difficult to modify, so that worthwhile improvement is frequently hard to achieve.

STIFFENING — One effect which can usually be obtained is durable stiffening. If a surface resin (type III) is applied to Acetate or Nylon and properly cured, the fabric is stiffened; this is useful for example in imparting an organdy finish to a sheer Nylon fabric. The durability of the finish depends on the degree of adhesion, and with Acetate and Nylon this is generally satisfactory, although with Orlon the adhesion is usually poor. If we should attempt to apply an internal resin (II) of the type which would give a soft crease-resistant finish to Rayon, there would be comparatively little penetration, and, on curing, considerable surface resin would form, again stiffening the fabric. It is apparent that, whereas in Rayon finishing we may speak of diffusible (internal) and nondiffusible (surface) resins, in the case of the hydrophobic fibers all common resin-formers may be regarded as nondiffusible. This is certainly true with Nylon and largely true with Acetate.

We cannot conclude, however, that resins of type II are equivalent to type III when applied to Acetate or Nylon. A material which is intended as an internal resin may not always have satisfactory adhesion when forced to become a surface resin through inability to penetrate the fiber. This can show up in the form of dusting when resins of type II are used for shrinkage control and for the creaseproofing of Rayon and Acetate combinations. The addition of alcohol and other penetrants is of little value in overcoming this difficulty. A better approach is the use of a very heavy squeeze to force the solution into the Rayon portion of the fabric, followed by careful drying at a low temperature to minimize migration. The addition of a small amount of true surface resin (type III), which has better cohesion because it is designed for the purpose, is often of value in minimizing dusting due to resin that has not penetrated, although, where dusting is caused by fiber embrittlement, such a resin may accentuate the trouble. Softeners and lubricants are generally beneficial in either case.

TABLE III
COMPARATIVE STIFFENING ON RAYON AND NYLON

Composition		Applied to Rayon		Applied to Nylon		
		% Surface Resin*	Hand	% Surface Resin	Hand	Washfastness
Urea-formaldehyde	III	>60	stiff	>90	stiff	good
Methylated melamine-formaldehyde	II—III	20	sl stiff	>90	stiff	good
Urea-formaldehyde	II	10	soft	>90	mod stiff	poor
Melamine-formaldehyde	II	10	soft	>90	mod stiff	poor

* Estimated, assuming average application conditions.

The varying ability of several commercial resins to adhere to Nylon is shown in Table III. In this simple experiment—not intended as a complete study—one polymerized resin (type III), two monomeric materials (type II) and one slightly condensed material (II-III) were compared for hand effects on Rayon and Nylon. It can be seen that the two monomeric materials not only gave inferior stiffening but lost most of the effect on washing. This is not to be considered a deficiency in these or other monomeric materials; they were simply not intended for the purpose.

SHRINKAGE CONTROL—It was pointed out earlier that Acetate and Nylon do not show much shrinkage and accordingly are not resin-treated for this purpose except in blends. In general, as the proportion of Acetate or Nylon in a Rayon blend is increased, the less resin is required to achieve a given level of shrinkproofing.

DURABLE GLAZING AND EMBOSSING — On Acetate a reasonably durable calender finish is possible without the use of resins; however, since Acetate is slightly hydrophilic and does contain a number of free hyroxyl groups, the use of cellulose reactants (I) to increase the washfastness of the effect is at least theoretically possible. On Nylon and the more hydrophobic materials, particularly those which can be heat set, no resin is required, and the problem is a completely mechanical one.

CREASE RESISTANCE — Acetate shows some improvement in this property on treatment with cellulose reactants (I), but the effect is not outstanding. There is room for further investigation in this field.

OTHER FINISHES—Surface-resin treatments are being applied to reduce yarn slippage on sheer Nylon fabrics and as heat-resistant finishes for Nylon press cloths. On Acetate attempts have been made, with moderate success, to utilize cellulose reactants (I) and diffusible resin-formers (II) to raise the softening temperature so that dress goods will not glaze on pressing.

THERMOPLASTIC RESINS

Leaving the thermosetting resins, let us turn to another large group of chemical finishing agents, the thermoplastics. This diverse assortment of materials includes water-soluble and solvent-soluble types, emulsions and self-emulsifying concentrates, and aqueous dispersions or latices. From a chemical standpoint they include polyvinyl acetate and chloride, polyacrylates and methacrylates, polystyrene derivatives, and alkyd resins, to mention a few. Including copolymers, the number of varieties seems almost endless. Since nearly all of these are completely polymerized at time of manufacture, no cure is necessary; you merely pad and dry. Further, being polymeric, they cannot penetrate the fiber, and therefore impart surface effects, which may include stiffening, bodying, softening, pigment binding, or delustering.

TABLE IV

COMPARISON OF FILM PROPERTIES WITH EFFECT ON FABRIC

Resin Film	*Fabric*
Soft, tacky	Soft hand; may have increased tear strength
Soft, rubbery	Soft, full bodied
Stiff, flexible	Leathery hand
Stiff, brittle	Crisp, firm hand; reduced tear strength
Discontinuous, powdery	Soft hand; may be delustered

In many instances the type of effect that may be obtained is dependent on the physical properties of the resin more than on its chemical nature. Thus, if we compare the properties of a dried-down film of resin with the effect imparted to fabric, we would usually find the sort of relationship indicated in Table IV.

There are exceptions to the above; the exact effect obtained is dependent on the degree of adhesion, which may in turn be dependent on chemical composition, particle size, dispersing agent, or other factors. As an example, sodium polyacrylate dries down to a stiff, somewhat brittle film and so should impart a crisp hand to Nylon fabric. But the effect is lacking because of poor adhesion, whereas polyacrylic acid gives an unusually crisp hand because of superior adhesion.

Similarly, the washfastness (an important point in this age of durable finishing) may vary depending on composition of the resin or composition of the fiber. In general, water-soluble thermoplastics are not washfast on any fiber, unless insolubilized by special means. Aqueous dispersions and many emulsions that give satisfactory washfastness on Rayon may or may not have satisfactory durability on Acetate or Nylon. In an unpublished study made a year or so ago, in which a variety of aqueous dispersions were compared for both original stiffness and washfastness, most had excellent adhesion to Rayon, but only a few were satisfactory on Acetate, and a few others, on Nylon. There was, unfortunately, no apparent relation between the composition of the polymer and the effectiveness on the various fibers in the series studied.

Without going into detail, we might divide the thermoplastics into three classes: water-soluble, solvent-soluble, and emulsified or dispersed types. Their main uses may be briefly summerized as follows: Certain water-soluble thermoplastics may be employed as finishing materials on fabrics that will be drycleaned rather than washed; or, as warp sizes; or they may be combined with thermosetting resins to impart added hand, while at the same time becoming insolubilized by interreaction so that the finish is washfast. Some of them may be insolubilized in other ways, but, generally, either a two-bath treatment or a high-temperature cure is required.

Solvent-soluble thermoplastics, of limited value because they must be applied from solvent solution, nevertheless have found use, for example, in imparting a very lustrous finish to Acetate ribbons.

Emulsions and dispersions that may be applied from water but that dry down to an insoluble form are of greater utility. Various members of the group, depending on composition, may impart bodying and stiffening effects to hosiery as well as to piece goods. They may have softening properties, may increase the strength of shrinkproofed or creaseproofed rayon, may bind pigments, not only for coloring but also for delustering, or may act as delustering agents without addition of pigments.

SPECIAL FINISHES FOR HYDROPHOBICS

Earlier we considered thermosetting resins and reactants and their use in making Rayon less hydrophilic. The opposite objective, that of making Acetate, Nylon, and other synthetics, more hydrophilic, has not been so easy to attain. In the case of Acetate, partial saponification has provided a reasonable degree of improvement and has, for example, greatly facilitated vat printing. Based on the same principle, a relatively new fiber (Celcos), containing an Acetate core and a saponified (cellulose) skin, has been designed to combine the best features of Acetate and Rayon. But with Nylon, surface modification by direct chemical treatment has not been very successful; present attempts to overcome the clammy feel of Nylon involve treatment with an alcohol dispersion of a Nylon derivative having greater moisture absorption than the Nylon fiber itself.

One of the most common difficulties encountered with the hydrophobic synthetics is their tendency to accumulate static electricity. The static charge results from a buildup (or deficiency) of electrons on the surface whenever the fabric is rubbed by a dissimilar material; and with hydrophobic (and therefore nonconducting) organic fibers the electrostatic charge can reach such

a magnitude as to cause considerable inconvenience to both the processor and the ultimate consumer. This can readily be remedied in a temporary way by treatment with a small amount of hygroscopic agent (alkylarylpolyethylene glycol condensates are particularly suitable), which attracts water to the fiber, or by the use of a little cationic softener, especially a quaternary salt. Either of these allows a static charge to dissipate, but, unfortunately, neither treatment is washfast. To date no durable antistatic agent for Acetate or Nylon has been found.

Two problems of considerable importance in the case of cellulose acetate (though not necessarily limited to that fiber) are those of gas fading and the tendency to glaze on pressing. Gas fading is believed to result from the action of nitrous acid present in combustion gases; this reacts with the dyestuff and causes fading and discoloration. Practically any alkaline material applied to the fabric tends to prevent or at least delay the shade change, and certain organic amines are particularly effective. Accordingly, there are many proprietary antifume agents being sold for this purpose; these are merely padded onto the fabric and dried, and in many cases they may be incorporated with other finishing agents. Many of them, however, lack washfastness, or dryclean fastness, or both. The newer types that are substantive to the acetate fiber have reasonable durability. The problem of glazing on pressing is a troublesome one for which no real solution has been found. As was mentioned earlier, thermosetting resins and reactants, which are used to hold a glaze on Rayon, may be employed to prevent a glaze on Acetate when padded, dried and cured. The end result, however, leaves much to be desired.

A challenging problem in the finishing of Acetate is therefore the development of a combination treatment that would provide durable antistatic properties, durable gas-fading resistance, and durable antiglaze properties. Needless to say, no such treatment has yet appeared.

"PROOFING" FINISHES

No discussion of finishing would be complete without allusion to a trio of "proofing" finishes, which have undergone considerable modification since the early days when they were first applied to cotton. Even the names have changed; we now refer to them as water *repellent*, flame *retardant*, and mildew *resistant*.

Water repellents, which formerly required two-bath treatments, evolved through single-bath semidurable treatments to the present-day single-bath durable finishes, which provide a reasonable degree of washfastness and resistance to dry cleaning. The three main types are the waxy pyridinium chloride and the melamine-resin-based form, both of which are effective on hydrophilic fibers and certain hydrophobics, and the recently developed silicone type, which at present is suitable only on hydrophobic fibers. Each of these, though they are chemically dissimilar, operates by enveloping the individual fibers in a thin hydrophobic layer, that is, a layer that repels water. Each must be given a full cure for optimum results, and two of the three require an after-wash.

Flame retardants, which have aroused considerable interest among finishers but have prompted little action, have largely been considered for use on Rayon, a fiber that tends to flare seriously in some fabric constructions when ignited. What has perhaps not received wide enough attention is the tendency for Acetate and Nylon to melt once they have been set afire, so that attempts to beat out the flames with the hands will invariably result in severe burns from the molten material, which has excellent adhesion to the skin.

Flame retardants for Rayon, in addition to nondurable inorganic phosphate and borate types and the earlier chlorinated paraffins and rubbers, include the following: (1) urea-phosphate-salt type, which is cured onto the fabric, sometimes in conjunction with a thermosetting resin; (2) titanium and antimony salts applied from an aqueous solution and then neutralized; (3) a thermoplastic vinyl-phosphate-chloride (or bromide), which is dried on from a solvent solution.

Only the last of these would be applicable to Acetate or Nylon, and they tend to stiffen the fabric excessively. Other recommended treatments for flame-retarding and "drip proofing" Acetate, such as impregnation with chloroethylphosphate and urea-ammonium bromide mixtures, are not durable.

Mildew resistance, the third of the "proofing" finishes, is necessary only on Rayon and other hydrophilic fibers. The true synthetics, possibly because they are not found in nature, are not subject to the ravages of molds and other microorganisms, although it is interesting to conjecture whether, as Acetate and Nylon become more prevalent, there will not evolve certain species of microorganisms capable of attacking them.

The early methods of imparting mildew resistance to cellulose fabrics involved treatment with salts of zinc, copper, mercury, or cadmium. Later were developed the organic fungicides, the chlorinated phenols and more complex materials, including certain quaternaries and other substantive types which have a reasonable degree of washfastness. The most recent advances have come through the realization that the cellulose molecule need be only slightly modified, as for example by partial acetylation or partial phosphation, to make it wholly and durably resistant to common cellulose-attacking molds.

CONCLUSION

In dwelling overly-long on certain aspects of the chemical finishing of synthetics, I have doubtless slighted others. For instance, I have neglected recent advances in softeners and have failed to mention certain specialty finishes, such as agents for imparting scroop. No reference has been made to Dynel, Dacron or the new Japanese fiber, Vinylon.

I feel that I will have served my purpose if I have impressed upon you the following considerations:

(1) That the term synthetics covers two distinct types of fibers, which have little in common except that they are man-made.

(2) That nearly all fabrics, irrespective of fiber type, can be improved by the application of a suitable chemical finish.

(3) That each class of finishing agent (e g, thermosetting resins) includes a variety of members, not all of which are suitable for a given purpose.

(4) That the successful application of a finish requires attention to processing details, and this is the responsibility of the finisher.

(5) That there is room for improvement in finishing agents, and this should represent a continuing challenge to the chemical manufacturer.

It is not too much to suppose that, by continued co-operation between the chemical supplier and the finisher, there will be developed new chemical treatments for various fibers, which will further enhance their utility, beauty, and sales appeal.

NOTICE TO DYE MANUFACTURERS

ALL data for inclusion in the Second Edition of the Colour Index (now in preparation) concerning the manufacture, properties, and application of dyestuffs made in the United States must be in the hands of the Coordinator by September 30, 1951, in order to ensure acceptance by the Board of Editors.

All correspondence regarding the new edition should be sent to William H Cady, AATCC Coordinator, 127 Power Street, Providence 6, R I.

Philadelphia Section———

CONTINUOUS DYEING OF VAT COLORS*

EDWARD H GAMBLE
E I du Pont de Nemours & Co, Inc

SINCE the beginning of World War II, the demand for vat-dyed fabrics has increased. At the same time the fastness, quality, and appearance requirements have become more rigid, and, because of competition and increasing labor costs, the cost of production has become a greater factor than ever before. To meet these requirements with lowered costs, it became necessary to adopt continuous dyeing.

Before discussing continuous dyeing, I shall review briefly the common methods of vat dyeing because continuous dyeing was developed to overcome many of the objections that were encountered with these older methods and, at the same time, to equal all of their good qualities.

The reduced jig process was originally the most common method for applying vat colors to cotton piece goods. In this method vat dyestuff is reduced and dissolved with caustic soda and sodium hydrosulfite and is applied from a jig until the proper exhaustion is obtained. Rinsing, oxidizing, and soaping complete the dyeing operation. The objections to this process are insufficient penetration and poor appearance. Most of the cotton piece goods produced in this country are mercerized, and mercerization accentuates these objections.

The next common process adopted was the pad-jig method. By this method the material is impregnated with unreduced, dispersed, vat pigment on a padder and batched on rolls. The rolls are transferred to the jig where the dyestuff is reduced with caustic soda and sodium hydrosulfite. Rinsing, oxidizing and soaping complete the operation. This method produces dyeings that possess the optimum fastness, good appearance and penetration. The objections to this process are shading and high labor and production costs.

OLDER METHODS OF CONTINUOUS VAT DYEING

The first continuous dyeing process was the reduced-pad method, by which dry cloth is padded with reduced vat-dye solution and passed directly into a series of wash boxes for rinsing, oxidizing and soaping. The color fastness obtained by this method is poor because the dyestuff does not have time to penetrate and fix itself on the fabric properly. The method is limited to light shades.

Edward H Gamble

The author reviews briefly various methods of applying vat dyes to fabrics, covering from the old reduced jig method and the first continuous methods to those modern continuous methods in which penetration and fixation of reduced vat dye take place in a water phase. He points out that these newer continuous methods making use of pad-steam installations and Williams Units not only are faster and more economical but they give better appearance, superior fastness, and less shading. Detailed recipes are especially given for preparation of dispersed vat-acid (acid-leuco) suspensions, which give superior results in quality of dyeing although they are not suitable for the production of heavy shades.

The next improvement in continuous dyeing was the reduced-pad-liquid-booster process. By this method the dry cloth is padded with reduced vat-dye solution and then passed directly into one or two large tanks, or *boosters*, containing caustic soda, sodium hydrosulfite and enough reduced dye to establish color equilibrium continuously between bath and fabric. The goods are then rinsed, oxidized and soaped. The boosters serve to give the reduced color time for penetration and fixation before being oxidized.

Over a long period of years very large yardages have been produced by this method. The cost of production by this process is more economical than by the pad-jig method and shading is very satisfactory. On many fabrics, especially those that are mercerized, the appearance, however, is not as good as by pad-jig, and the fastness in many cases, although passable, is inferior. The process also has definite limitations economically in that each booster has a capacity of 1500 to 1800 gallons, and appreciable amounts of chemicals are needed to set up the boosters at the beginning of each run. Long yardages are therefore needed for economical operation. Also, it is not possible to obtain deep shades because the maximum concentration of dye in the pad box is governed by the limit of solubility of the leuco or reduced color. Although deep shades can be produced by applying the dye in dispersed-pigment form, drying, and reducing in the boosters, long yardages are needed to offset the make-up cost of the boosters. This method has therefore been abandoned for more modern methods.

MODERN CONTINUOUS VAT DYEING

All of the above dyeing methods have one or more definite limitations, such as high cost, poor quality, or limited range of shades. The ideal continuous dyeing process should give good control of shade, a full range of shades, and the good quality obtainable with the pigment-pad-jig method. It also must be a process by which short runs can be made economically. These requirements are met by the pad-steam method or by use of the Williams Unit. By these continuous methods both short and long yardages in light, medium, and heavy shades can be produced on all types of cotton piece goods. At the same time, optimum fastness, excellent appearance, uniformity of shade, and low cost of production are obtained.

As it would be impossible in the time allotted to discuss all of the possible modifications of these two processes, we will describe only those that are most commonly used.

Method 1. Pigment Pad, Dry, Chemical Pad, Steam

By this process the color is applied in

* Presented at the Meeting-in-Miniature in Philadelphia on October 28, 1950.

dispersed-pigment form and dried either on cans or in a flue dryer. The dried pigment-padded material is then impregnated in a two- or three-roll padder with caustic soda and sodium hydrosulfite. The goods are then steamed for ten to fifteen seconds, washed, neutralized, soaped and washed all in one continuous operation.

As there are no limitations to the concentration of dyestuff that can be applied, a full range of shades from pastels to deep shades can be obtained. The fastness and appearance equal those obtained by the pad-jig method.

This method is economical for small yardages because a number of small lots which have been previously padded and dried can be run successively through the steam range with a minimum amount of cleaning between each shade. This procedure eliminates the shut-down time of striking off patches and the making up of solutions for the machine, both of which are necessary with the liquid-phase methods.

Method 2. Pigment Pad, Do Not Dry, Chemical Pad, Steam

By this procedure the dispersed color, together with caustic soda, is applied in the first padder. The goods are then passed through the chemical padder, which is charged with caustic soda, sodium hydrosulfite and sufficient color to form an equilibrium between fabric and bath. The goods are then steamed for ten to fifteen seconds, washed, neutralized, soaped and washed.

Since the cloth has the same water and caustic soda content going into the chemical padder as coming out, the only addition required for the chemical pad during the run is sodium hydrosulfite, which is fed dry, usually at the rate of five pounds per 1000 yards. In this process drying and feeding of caustic soda to the chemical padder are eliminated. To effect an equilibrium between cloth and chemical pad liquor, this process requires an initial charge of 25% to 40% of pad liquor for starting as compared with 0% to 3% by the previous method in which the goods are dried before the chemical pad.

Although optimum fastness and uniformity are obtained by this method, the appearance is not too good because nubbiness is accentuated. It is therefore recommended only for low-count unmercerized fabrics.

Method 3. Pad Reduced, Steam

By this process the color is applied to the material in the reduced state. The goods are then steamed for 10 to 15 seconds, washed, neutralized, soaped and washed as mentioned in the two foregoing methods. The depth of shade obtained depends upon the limit of solubility of the dyestuff. This procedure is used only for light shades. The chemical cost is very low, and, if nip padding is employed to eliminate initial exhaustion, this process is very simple from the standpoint of control. Optimum fastness is obtained by this method, which is mostly for dyeing unmercerized fabrics and for overdyeing prints. Use of the method is limited by the fact that the appearance is not equal to that obtained by Method 1, 5, 6 and 8.

Method 4. Reduced Pad, Steam, Liquid Booster

This process consists of applying the reduced vat dyestuff to the material on a padder and immediately rereducing in a steam and liquid phase. The goods are finished by washing, oxidizing and soaping. The steam and liquid phases are obtained by installing small liquid boosters in the steamer (150-250 gallons). These boosters contain the customary caustic soda, sodium hydrosulfite, and color, and they serve to effect a leveling action. This method is particularly suited for goods that have been poorly prepared. Because of the high temperature of the boosters it is not very suitable for the chlorine-fast types of blues.

Method 5. Pigment Pad, Do Not Dry, Williams-Unit Reduction

By this method the color is applied on a padder in dispersed pigment form and is reduced in one or more Williams Units, which contain caustic soda, sodium hydrosulfite and reduced color to establish equilibrium between bath and fabric. The material is then washed, oxidized and soaped. The reduction temperature is usually 180 to 200° F; chlorine-fast blues are run at lower temperatures. In this process, dyeing takes place in a liquid phase, in which considerable leveling action takes place.

Method 6. Pigment Pad, Dry, Williams-Unit Reduction

By this method the pigment-padded material is dried and then reduced in one or more Williams Units. This method is often preferred for the darker shades and tends to produce better appearance than reduction of pigment on undried goods.

Method 7. Pad Reduced, Rereduce in Williams Units

By this method the color is applied to the material in the reduced state. It is then rereduced in the Williams Units, which contain caustic soda, hydrosulfite, and equilibrium color. Washing, oxidizing and soaping follow in the usual manner. This process is satisfactory for light shades, but pigment-pad application prior to reduction is preferred for most shades and fabrics.

Method 8. Pad Acid Vat, Do Not Dry, Chemical Pad, Steam

This process is the latest development in vat-color application. It has become very popular and is used extensively for the dyeing of light and medium shades. On lower-count cotton piece goods it produces results that approach the Indigosal, Algosol or soluble-vat-type color appearance than is obtained by the pad-steam, Williams-Unit or pad-jig methods. For voiles, lawns, print cloths, percales, 100 x 60 broadcloths and shirting oxfords it produces excellent results. On fabrics such as 128 x 68 and 130 x 60 broadcloths the dyeing is slightly inferior or at best equal to the results obtained by pad-steam, Williams-Unit, or pad-jig for appearance. On higher-count broadcloths and poplins the appearance is definitely inferior to other methods.

The following procedure for preparing an acid vat has proven very satisfactory:

150-GALLON MIX OF VAT ACID
To 120 gal water add successively
9 lb 6 oz Blancol, Lomar, or Tamol, previously dissolved in water,
8 lb caustic soda, previously dissolved, and
6 lb sodium hydrosulfite
Reduce at 120°F for 10 minutes and add
5 gal acetic acid, 56%, and sufficient water to make a final volume of 150 gal.
Add finally
1 lb sodium hydrosulfite

Care should be exercised not to apply heat or steam after reduction because either of these treatments will cause oxidation of the acid vat and later shading of the goods. Prolonged agitation of the dye mix will also cause oxidation.

Some plants prepare acid vats by reducing the dose in a small volume and then straining it into a large volume containing acetic acid as follows:

150-GALLON MIX OF VAT ACID
Reduce in 50 gal of water at 120°F for 10 minutes vat dyestuff,
7 lb Blancol, Lomar or Tamol previously dissolved,
6 lb caustic soda, and
6 lb sodium hydrosulfite.
Strain solution in 100 gallons water containing
3 gal acetic acid, 56%, and
3 lb Blancol, Lomar, or Tamol. Finally add
1 lb sodium hydrosulfite.

Short-volume reduction should produce a finer particle suspension, but straining is often an undesirable operation. Long-volume reduction eliminates straining and permits greater color concentrations to be used.

In this method of dyeing, the goods are not dried after being padded with vat acid. The damp goods are impregnated in a second padder with a solution of caustic soda, sodium hydrosulfite and enough vat acid mix to prevent tapering and then steamed 10 to 15 seconds. The dyed goods are washed, neutralized and soaped in the usual manner.

As the depth of shade by the vat-acid method is limited to the solubility of the dyestuff during the reduction step, it is suitable only for light and medium shades.

As we mentioned earlier, there are many more modifications of continuous vat dyeing, but the eight methods that we have described are used extensively. By these continuous methods we are able to produce pad-jig quality, appearance, and fastness, and at the same time to increase production and to lower operation costs.

Philadelphia Section———

OBSERVATIONS ON THE DYEING OF FIFTEEN-DENIER NYLON FULL-FASHIONED HOSIERY*

JOHN KOCH, JR
Superintendent of Dyeing, Artcraft Hosiery Mills, Darby, Pa

A hosiery dyer discusses broadly the preparation and pretreatment, dyeing and finishing of hosiery, dealing mainly with 15-denier nylon hose since this type constitutes about 70% of today's production. Not only practical procedures, but also experiments carried out on a plant scale are described.

Preboarding, or the process of giving nylon hosiery a set, scouring, bleaching, bagging, and the various ideas of how these operations may be carried out are explained. Under the subject of dyeing, the use of assistants, the effect of pH and temperature and the technique of getting a good union between monofilament and multifilament yarns and yarns of different deniers receive most attention. The use of dulling agents, resins and softeners in finishing are covered.

It is finally emphasized that snag resistance, solidity of shade, freedom from mending, and the proportion of firsts are a final measure of the success with which the many operations required for modern hosiery manufacture have been carried out.

INTRODUCTION

THE full-fashioned hosiery industry is now entering its second fifty years, while it is in its second decade of nylon hosiery. There have been sweeping changes, not only in the last fifty years, but as recently as in the last five. Fifty years ago cotton and lisle hosiery sold for about the same prices as nylon does today—one to two dollars a pair. Black silk at that period was priced at about $7.00 a pair. However, a seven-course dinner cost but 30c, so the comparison is obvious. Hosiery prices in comparison with other goods have come down, while quality and beauty have improved tremendously.

I have chosen to speak about 15-denier hosiery alone because today, as this is written, about 7 out of each 10 pairs of full-fashioned hosiery sold are of that type. It was in 1940 that we had the first of the 15-denier hose and they were of 60 gauge. Nylon was only introduced in 1938, so it did not take long until we were called upon to dye the finer deniers. However, before the war most nylon hosiery was of the 30-denier, 45-gauge type. It was not until 1945, after war restrictions were lifted, that nylon hosiery really began to come into its own. In 1947, 15-denier hosiery was trickling into the market, and today it is without doubt the bright star in the full-fashioned hosiery picture.

The past three years have seen tremendous changes in the hosiery industry as production has reached peaks and then dropped off. There was first a period when all types of hosiery sold easily, then a time of intense competition and, finally again a period of easy sales. The dyer had to keep abreast of these developments, and a great deal of personal experimental work was done. The first problem was to dye a good union between monofilament and multifilament yarn. Next came the demand from nearly all hosiery buyers for a duller finish. There was also the popular conception that hosiery of today did not wear as well as that of ten years ago. However, a national woman's magazine has taken a survey, which showed that our 15-denier hosiery today outwears the old two-thread silk, three to one. In the past year, many dyers had a further problem with supposedly resisted threads in novelty heels, seams, etc. However, the dyeing of these threads has improved, and better methods of handling have helped the dyer overcome any troubles on this score.

John Koch, Jr

This paper will be in the nature of a review of the dyeing of the before-mentioned 15-denier hosiery. Methods of handling, scouring, dyeing, finishing and final evaluation on the pairing table will be discussed.

PREPARATION OF HOSIERY FOR DYEING

PREBOARDING—The handling of nylon hosiery after it comes from the knitting machines before it goes to the dye house has a great deal to do with the finished product. Nylon has the ability to take a "set," that is, the fabric can be formed to a shape which cannot be easily altered by operations through which it must still pass or by its eventual use. Fundamentally, setting is the reduction or elimination of subsequent yarn shrinkage, the yarn retaining the form or shape to which it was held in the setting process. There are roughly three methods by which this setting can be imparted: wet setting (boiling water), steam setting, and dry-heat setting. Steam setting produces a better degree of set than is possible in either of the other two methods. Several years ago we tried setting at extremely low temperatures. At 20° below zero results were only so-so and the experiments were dropped. In steam setting there is a great variation from mill to mill. Temperatures vary from 215 to 270° with a pressure variation of from 11 to 21 pounds per square inch. The time cycle is also very variable, each processor using the cycle that experimentally gives him the best results. Time cycle and temperature are extremely important with respect to shade. The shade increases in redness as the temperature rises in the preboarding retort. This seems to hold true in nearly all dyeing combinations. We have tried combinations of Scarlet B (Pr 244), Fast Red GG (Pr 236), Red 3B (Pr 61), and Fast Pink RF (Pr 370) in conjunction with Yellow 5G (Pr 245), Fast Yellow RR (Pr 243), Fast Yellow G (Pr 242), Yellow N and Fast Blue FFR (Pr 228). Our results bear out those

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of Mr Siegrist in his paper of October, 1947. He found this to be true with a combination of Scarlet B, Fast Blue FFR and Fast Yellow G. From this it is easily seen that preboarding equipment must be calibrated to give approximately the same set in all cases. If this is not done, one size preboarded on one machine may vary distinctly in shade from another size where either the temperature or time cycle varied.

The methods of preboarding, or setting, are different from mill to mill and vary slightly in reference to type of equipment and manner of handling. The two most commonly used treatments are the conventional, *preboarding, dyeing, and boarding*, and the Dunn system, *presteaming, dyeing and postboarding* in a preboarding retort. Still another method now becoming popular is a presteaming operation before seaming and looping, followed by either of the other two treatments. In the conventional method the handling of the goods after preboarding is extremely important. There is a wide difference of opinion as to how this should be done. A great many mills are laying the preboarded work out on boards in half dozens, then folding the stockings from three to six times before bagging them for dyeing. This method seems to eliminate all creases, but, in some cases, tends toward unevenness and more redyes. There is also an increased cost of perhaps a cent a dozen to bag them in this manner. However, most mills using this method feel that the better appearance of the goods more than offsets the increased costs and redyes. Several mills are bagging goods as soon as they have been preboarded and then storing them in a tank under water. This procedure eliminates creases, but is awkward and again increases costs slightly. If hosiery were bone-dry coming from the retort, there would not be much of a problem. Creases are definitely eliminated in most work that is left to dry before it is bagged. This is not only my own observation but that of all dyers with whom I have discussed the crease problem. It seems to be a fact that creases are greater when moist goods, after being preboarded, are bagged and left in trucks or racks for some time before being dyed. We proved this by marking creased greige hosiery with an indelible ink before dyeing. A careful check after boarding showed creases in all cases at the marked spots.

PRESTEAMING — Presteaming before seaming and looping brings several interesting facts to light. We began this method primarily for the increased yield it would give of first-quality hosiery. Before we began this method, we had a yield of only 55 per cent from each 100 dozens processed. We are now getting 68 to 80 per cent. Mending has been reduced appreciably, and, after checking all departments, both before and after starting this method, we have come to the conclusion that a good deal of the increased quality should be attributed to this process. The hosiery is duller from this presteaming than it had been from our conventional method. The seaming and looping operation is much easier after the goods have been steamed. As the hosiery comes from the knitting machine, it is put into the steaming chamber for 50 minutes at a temperature of 200°F, 35 minutes of that time being at a relative humidity of 70 per cent, the remaining 15 minutes in a dry atmosphere. This is followed by either the conventional or Dunn system. You will note that I spoke of this as a presteaming method. I consider that actual setting takes place in the preboarding retort at its higher temperature and added pressure. In our plant this step is followed by the conventional-type handling. After our first tests were checked, several interesting facts became evident. As a matter of course we continually check shrinkage from our normal preboarding operation. We found, however, that after presteaming before preboarding, results did not check. The boot of 15-denier yarn shrank the same after preboarding whether presteamed or not. Welt yarn, multifilament of either 40 or 50 deniers, shrank a great deal less. The yarn saving was appreciable, so much so that the saving in yarn was more than the cost of the treatment and soon paid for the equipment. There was also found to be a slight saving in the amount of seaming yarn necessary. Summing up all advantages, we found a saving in multifilament yarn, less consumption of seaming thread, duller hosiery, easier seaming and looping, and a saving of from 10 to 20 per cent in yield of first-quality hosiery. In this method, however, I would like to inject a note of warning. Some thought should be given to the selection of the oils used in knitting. Unemulsifiable types of knitting oils and wax treatments are extremely hard to remove after a steaming of this sort.

BAGGING—Hosiery is sent to the dye house in bags ready for dyeing. The size and type of bag vary a good deal from mill to mill. We have experimented with cotton bags of different sizes, bags made of cotton and rayon mixtures, mesh bags, mesh bags with a cotton liner, sleeve-type bags, and nylon and Orlon bags. Our best results were obtained with a cotton bag of the sugar-bag type. Probably the type dyeing equipment has a lot to do with the choice of bag. As all of our dyeing machinery is of the rotary type, all of the following discussion will be based on use of that kind of equipment. If a bag of whatever type is filled, by that I mean snugly, with preboarded hosiery, results seem to be better. We are now using a 20 x 30-inch bag, and we put about 3 dozens of preboarded hosiery in it. There is a large shrinkage in a bag of this type, so that, after being used several times, it will measure approximately 16 x 26". The bags are scoured and stripped after each dyeing and are then dried in a tumble-type drum dryer. We find this gives a soft hand to the bags and their life is prolonged appreciably. For size identification we use looper clips made of cotton that we vat dye in a variety of colors. They hold up very well during dyeing and are easily identified. Rubber bands did not seem to be able to do the job in our setup. We have had a minimum of bags opening in the dyeing operation, and the easily identified strings help the sorting after dyeing.

SCOURING—The scouring procedures used for nylon hosiery are as varied as the other operations we have discussed. There are devotees of the one-bath method, that is, scouring and dyeing in one bath, and there are as many dyers who use only the two-bath method. Fifteen-denier hosiery must be cleaned of graphite, size and knitting oils either before or during dyeing. If there is an abundance of graphite or oil on the hosiery, the two-bath method is probably better. The use of different scouring ingredients is very general, some dyers being partial to soap and some using synthetic oils or synthetic detergents. A detergent, whether soap or a synthetic, must have the power to remove foreign matter, such as dirt, graphite, oil, or size, and to keep it in solution in the bath to be washed away. Soap or any of the synthetic detergents have this ability, but the dyehouse setup determines which to use. If the dyer has to contend with hard water, synthetics are definitely superior. Hard water forms insoluble residues with soap. Water should contain less than 50 parts of hardness per million before soap is used as the main scouring ingredient. However, it is the opinion of many dyers that soap in a soft-water bath gives better results than synthetics. A certain dyehouse with zeolite-treated water is dyeing in a bath with about 10 parts of hardness per million. In such a case, soap could be used in the scouring bath and one of the synthetics in the actual dyeing operation. The use of alkalies, such as caustic soda, soda ash, trisodium phosphate or tetrasodium pyrophosphate, speeds up scouring a great deal. However, in the one-

bath method the pH will rise with the addition of one of these alkalies, and, in all of our experiments, the union between monofilament and multifilament yarn in dyeing suffered as the pH went higher. In our experiments from an extremely low pH, below 4, to a high one of nearly 11, we obtained best results in unions between monofilament and multifilament yarns at about pH 6.8. I use one of the alcohol sulfates for dyeing primarily for this reason, its low pH value. We seem to get best results in a bath with a pH between 6.5 and 7.0. The scouring bath should contain a liquor ratio of from 20 to 30 to 1, as should the dye bath. When a two-bath method is employed, the scouring bath may contain 4 per cent of soap, 4 per cent of an alcohol sulfate and 3 per cent of one of the above-mentioned alkalies, such as trisodium phosphate or tetrasodium pyrophosphate. Temperatures may be in the range of 170 to 190° and the scouring time should be 30 to 45 minutes.

In checking various types and methods of scouring, we found several extremely interesting things. First, in a single size of one shade processed exactly the same from the time of knitting, a variation in shade was evident. At the same time we were finding a considerable portion of our production badly ringed or striped. Checking the denier of the yarn, we found a variation from 14 to 19 deniers. Going further and checking yarn on the cones, we also had a variation, though not as great, from 13 to about 17. Several cones were chosen at random and were put on a specific head of a knitting machine; twelve stockings were run off and kept separate. The operation was then repeated with a fresh cone until we had ten lots of twelve stockings each. The lots were kept separate but were put through all operations together. After the stockings were dyed, a careful check was made of each, and each dozen showed *some* variation in shade, with light rings evident in many. This all seemed to point to a yarn condition with the dyer able to do little about it. However, in checking the yields and breakdowns of various lots with different scours and a variety of methods, we found that some scours and methods invariably gave more first-quality goods than others. Further, we found that goods after being stripped and redyed showed less two-tone effects and rings than they had formerly. We were stripping and bleaching in a two-bath operation, the goods being almost white after we had finished. The stripping bath was made up with 2% of 56% acetic acid and of 4% sulfonated alcohol, and the goods were run at 180°F for 5 minutes. Then 6% of zinc formaldehyde sulfoxylate was added, and the stripping was run for an additional 25 minutes. The bath was then dropped, and the stockings were given a hot rinse. The second bath was then made up with 2% of Textone and 6% of sulfonated alcohol, and the stockings were bleached at 120°F for 5 minutes. Then 2% of acetic acid was added, the temperature was raised to 180°F, and the bleaching was continued for 30 minutes more. The bath was then dropped, and the goods were ready to be redyed after a hot rinse. Our results from redyed lots seemed to point to the introduction of hydrosulfite into the scouring bath. Results were better, but still left much to be desired.

A southern dyer then graciously gave us a formula with Textone in the scouring bath and set us off on another line of experiments. This formula gave us a good yield, but we still had some two-tone work and rings were as bad as with hydrosulfite. Finally, we began a series of research experiments on different scours and bleaches, keeping the fact in mind that we were after a bleach either before or after our scour. From this series of tests we found quite a few interesting things: first, that a bleach before a scour had very little effect on yield; second, hydrogen peroxide did not do nearly as good a job as did chlorine; that is, it did not help two-tone effects or rings as well as did chlorine; third, bleaching solution did not do as good a job as did Textone. We finally worked out a two-bath scouring procedure that practically eliminated both two-tone effects and rings. Our first bath is exactly the same as the one I spoke of earlier: 4% soap, 4% alcohol sulfate, and 3% trisodium phosphate. Scouring is started at 175°F and run for 30 minutes. The bath is then dropped and the stockings are given a 5-minute wash at 160°F. The next bath contains 2% acetic acid, 4% Textone, and 4% alcohol sulfate and the goods are bleached 30 minutes at 175°F. A hot wash follows, and dyeing is begun in another bath. I have here a stocking cut in half, one half only scoured, the other having had the full treatment. I am unable to give a reason for the lightness of the rings with the Textone treatment. The denier remains the same, but appearance is definitely altered. There is an odor of chlorine dioxide that is unpleasant during this operation. The use of formic instead of acetic acid is helpful in lessening this, but my results have been slightly better with acetic acid.

The manufacturer of Textone recommended a one-bath procedure with 5% Textone, 5% tetrasodium pyrophosphate, 1½% 100-volume hydrogen peroxide, 1½% synthetic detergent, and 6½% of 85% formic acid at 190°F. I was unable to get the same scouring action from this method as I had been getting in the two-bath operation. In this acid-repressed method a much longer time is required for scouring. Increased concentrations of chemicals cut this down somewhat, but it was still a long process. However, the use of tetrasodium pyrophosphate instead of trisodium phosphate did help repress the chlorine dioxide that was given off during the operation. There is a good deal more experimental work to be done on this, but I think you'll agree that results such as shown in these samples indicate it would not be wasted. I would also like to bring out the point that this is an expensive procedure in dollars and cents. Both chemical cost and length of time, which are always expensive dyehouse items, are considerable. However, if rings or two-tone work are evident in finished goods, the use of such a process could be an economy with its increased yield.

DYEING HOSIERY

As there has been a good deal published on the actual dyeing of both nylon yarn and hosiery, I am going to skip over much of this part of the subject rather hurriedly. First, however, I would like to bring out the point that dyestuffs that accentuate physical differences in yarn give better results after a Textone treatment. This especially applies to acid types and Nydyes. Acetate colors probably dye more evenly, and give better color value than any other colors we have today, while at the same time permitting fairly rapid dyeing. However, to get a good union between 40- or 50-denier nylon welt and 15-denier monofilament nylon boot, temperatures must be kept low, such as 150 to 160°F. At such low temperatures there is only a partial exhaustion, and extreme care must be taken with regard to time of dyeing. I spoke of our results with low and high pH values and of the better unions with the pH just below neutral. The acetate blue is probably the poorest in the dyeing formula in that it nearly always is first to migrate from multifilament to monofilament yarn. The union between welt and boot becomes progressively worse as the time of running increases. The theory that particle size of the dyestuff either promotes or retards this action seems to be borne out by the fact that unions are generally poor in an alkaline bath, the idea being that better dispersion of dyestuff promotes migration. Therefore, reversely in an acid bath of low pH, migration should be at a minimum. However in our experiments we found better results at a pH of 6.8 than we had at a pH of 4. We did find that Blue FF from one manufacturer had less migrating properties than that of an-

other. The same thing held true for both red and yellow. The rate of exhaustion was also different from one manufacturer to another. Probably the only way to choose the best dyestuffs for a specific mill is by a series of experiments.

I had the idea for some time that these dyestuffs, a red, yellow, and blue with nearly the same rate of exhaustion, would give a better union than the Scarlet B, Yellow G, and Blue FF we were using. Working with a dyestuff company, we finally came up with three colors that looked good. Laboratory dyeings were excellent. However, when we began production runs we ran into trouble. I finally decided that the dyestuffs were too sensitive to the variables encountered in our dyeing, such as pH of the bath, amount of chlorine in the water, etc. As our water continually changed, both in chlorine content and pH, we finally had to discard this group.

VAT DYES—A series of experiments with vat colors seemed to show a great deal of promise. Separate dyeings of individual colors were good both in union and shade variation. However, some colors dyed much better unions than others. Combinations to match hosiery shades did not in any case show a good union between multifil and monofil. Although this method showed little hope for use on full-fashioned hosiery, it did show some promise in the solid-color dyeing of effect threads.

NOVELTY HOSIERY — The novelty hosiery so popular in the past year posed new problems for the dyer. Colored heels and seams, colored outlines on feet and heels, and striped heels all had to be handled carefully. We early found that our Textone treatment was not suitable because the colored effect threads were changed greatly in shade. A new scouring formula had to be worked out for we found that high alkalinity, coupled with high temperature, also bleached and changed the shade of these effect threads. A scour with 5% of an alcohol sulfate and 2½% of potash soap for 30 minutes gave a fair cleansing. The dye bath was made up with 3% of alcohol sulfate, 1½% of potash soap and 5% of a nonionic condensate. This seemed to hold our color on the effect threads, but of course our rings and two-tone effects were much higher than in our other work.

NONIONIC ASSISTANTS—The use of nonionic assistants in the dyebath to promote dispersion and leveling, while retarding dye exhaustion, is becoming more popular, the theory being that these products, by increasing particle size, retard migration of dyestuff from welt to boot. However, they are extremely stable and will prevent scum or oil formation. As the pH of these products is very nearly neutral in most cases, they have little effect on the pH of the bath. Nonionic surface-active agents remain stable in the presence of either anionic or cationic agents. This happy property means that they are stable in the presence of soaps and sulfated oils, which are anionic; they are also unaffected by alcohols. It further means that even if not rinsed out properly, they would cause no breakage with permanent softeners, finishes or splash-proof finishes, which are mostly cationic. All work we have done on this type of material has not shown that they are dye retardants in so far as our operations are concerned. Taking samples at ten-minute intervals from start to finish of a dyeing operation, we found little advantage in dye retardation using this type of material. However, we did find that in all cases unions held up better for a longer period of time with nonionic assistants in the dyebath. In other words, migration began after the first dye addition without them, but in all cases, if feeds had to be given to lots, the unions were better when they were used. There is the danger of getting too high a percentage of these nonionics, in that the red and blue dyestuff are extremely hard to get on the fabric, while the Yellow G gives better tinctorial value than without them. We are now using 5%, having found that anything over that means trouble. I have talked to dyers, however, who are using 8 to 10% and getting excellent results. The amount and use of these nonionic surface-active agents must be worked out experimentally for each specific dyehouse.

MATCHING SHADES—I would like to say a few words about the actual mechanics of matching hosiery shades. We all know color depends on the nature of the light reflecting power of materials and the eye of the observer. First, the nature of most natural light which a dyer has to work under is reflected, that is, the light strikes trees, walls, and many other objects, being reflected from them to the sample. Daylight itself is continually changing because of dull days, bright sunlight, atmospheric changes, etc. Most dyers today have found ways to overcome this problem. Some are using lamps with both daylight and incandescent light. Others have closed-off rooms allowing no outside light and using batteries of daylight fluorescent lamps. However this is done, the important consideration is that the light should be constant. We have a room with no outside light, in which illumination is from four large batteries of fluorescent daylight lamps. Brightness is checked at several locations with a light meter at regular intervals. We have found that the intensity of the light lowers quickly after about six weeks. Secondly, construction, twists and finishing materials make color matching difficult. For instance, to match a 60-gauge, twisted 15-denier, to a 45-gauge, untwisted yarn is extremely difficult. Lastly, the eye of each observer sees a color slightly different. Changes in the eye due to advanced age, natural differences in the eye, and inexperience in color matching all help to cause differences of opinion as to how good a match you have. Matching a shade to a sample under different lights, unless both are dyed with the same dyestuffs, is again almost impossible. There is a great variety in formulation among hosiery dyers. Some dyers use three, some four, and a few, five dyestuffs to match a shade. Some may use a blue, others a violet, some a red, others a scarlet. Thus you can readily see why shades match in one light and not another. There is also the danger that a sample after being used some time becomes dirty or changes shade slightly. This may lead to dyeings at the end of a season being quite different from the same color at the beginning. We have overcome this by choosing two dozens from the first lot of a new shade. These are put away in boxes and each week a new sample is used, the previous one being discarded. A clean sample, constant light, and dyestuffs such as those used on the sample will help immeasurably to insure a good match.

FINISHING

The finishing of nylon hosiery after dyeing has made tremendous strides in the past few years. Whereas silk was finished with waxes, starches, and a variety of gums, today's nylon hosiery is finished mainly with synthetic resins, the two most popular of which are vinyl acetate and methacrylate. These finishes are durable and, at the same time, give improved fastness to acetate colors. In the past year we have seen the introduction of a nylonizing treatment, that is, the use of an alcohol-soluble nylon (type 8) as a hosiery finish. This is a water-dispersable solution, citric acid being used as an exhauster. It imparts to the hosiery a soft, silk-like, moisture-absorbent finish, entirely unlike that of any of the resin types. The polyvinyl types impart a crisp finish, while those of the methacrylate types give a much softer hand.

DULLING—The dulling of nylon hosiery has been a problem that all dyers have been asked to work on. The use of barium or titanium salts as dullers is fairly common; however, both are extremely

hard to exhaust on nylon hosiery. Acetic acid helps exhaust them to some degree, but conditions vary from mill to mill, as does the amount exhausted. The majority of vinyl-type resins finish with a hard shiny surface; however methacrylate types together with them seem to impart a good hand with a fair amount of dulling. Either the resins themselves or the emulsifiers break in the presence of the others to impart a better dullness than is possible with either one alone. However, care must be taken that the percentages are not out of balance or a spotty scum will form on the hosiery that is almost impossible to remove. There has been a great deal of experimentation on various finishes, not only by the dyer but by the manufacturers of the chemicals themselves. Urea, starch, and a variety of other chemicals have been used in conjunction with resins with varying success. You can only decide the finish that will suit your company by a series of experiments and tests.

EVALUATION—The actual evaluation of a stocking does not take place in the dyehouse or boarding room but is judged on the pairing table. That is the place where a dye lot either yields enough first quality merchandise or shows unprofitable manufacture from the knitting machine to the dyehouse. I have tried to show that rings and two-tone work can be helped by the dyeing procedure. Pull threads, cat eyes, and other defects cut down the yield and increase the work of the mending department. We have done a good deal of work with the sandpaper method developed by Dr Smith of DuPont to see what relationship there is between different operations and increased amounts of pull threads. Our first tests were with 3/0 sand paper, but, to get a better comparison, we changed to 2/0 sand paper. We ran a varied type of experiments, first a series to see just what result different preboarding temperatures and cycles would have on this test. We found that no temperature or cycle stood out superior. The same result was shown in a series of tests on various scours. However, when we ran a series of tests on various finishes we did find a great variation. Going further, and testing a score of competitors work (branded hosiery) we also found a wide variation in snag resistance. Strangely enough. one fact stood out: those finishes that gave crisp hands were invariably good. The soft, raggy finishes ran poorly in all cases. There is a close connection between picks and pulls on the pairing table and the way a certain lot averages on the snag tester. We were also able to check our thoughts that presteamed goods ran better in snag resistance than those that were not.

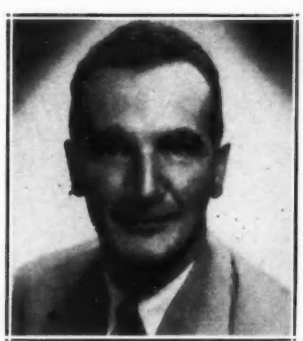
It seems that the job of the dyer today in the full-fashioned hosiery business is changing. Not only is he expected to match colors, but he must be continually experimenting to improve the quality of the finished product. A continual check with the pairing department and close cooperation with quality control will show where there is need for such work.

PERSONNEL SERVICE AT CONVENTION

For the purpose of introducing members to prospective employers, Personnel Service will operate, without charge, from Wednesday afternoon, October 17, through Friday morning, October 19, at the New York Convention.

Every member expecting to use this Service in seeking employment is requested to write in advance to Dr H C Chapin, Secretary, AATCC, Box 28, Lowell, Massachusetts, for two blanks on which to state his qualifications and desires. For attachment to these, two paragraphs measuring about 2 x 2½ inches are desirable.

Employers registering with the Service will be permitted to consult these records, and will be assisted in arranging interviews between 2:00 pm and 5:00 pm on Wednesday; between 9:00 am and noon, and 1:00 pm to 5:00 pm on Thursday; and between 9:00 am and noon on Friday. Representatives of educational institutions also are invited to register for the purpose of answering inquiries about their students.



A F Felgendreger

Mr Felgendreger is a co-author of the paper "Present and Future Trends in the Dyeing of Woolen Fabrics", which appeared on page P494 of the August 6 issue.

Detergents—

(Continued from Page P523)

The supporters for alkylarylsulfonates, sulfated amides, and for many other types of detergents each would have their say. Invariably though, the final conclusion would be this· We would be in a mighty tough spot today if we didn't have a wide variety of detergents and blends to choose from. The increasing number of fiber types and blends and the increasing complexity of the processing problems we have to face has meant that we must have many detergents with many properties in order to do our work.

XX. *How does one choose a detergent?*

This is unquestionably the $64 question. The prize in this case, however, is satisfactory processing. We have seen that no one detergent has all the properties required to do all the different jobs in textile processing. We have seen that the problems themselves vary from the simple to the complex. We have seen that the measurement of no single property will tell whether one detergent will do a better job than another. Neither wetting nor surface tension measurements nor even standard-soil-cloth tests will definitely tell us which to choose. Obviously, there is only one final way to choose our detergent. We must, first of all, use sound judgment in evaluating our detergency problem. Then, we must select for trial under actual plant conditions those few detergents or detergent blends which, on the basis of constitution or proven worth under similar conditions in other plants, seem to have the properties that will be required. From the results of these intelligently planned trials we can finally choose the proper detergent and so put an end to . . . our dilemma.

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the Secretary.

51-14

Education: BS, Textile Engineering

Experience: Two years in dyehouse

Age: 23; single; references; position as asst dyer in Southeast or West desired.

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• PATENT DIGEST •

PAUL WENGRAF

SCREEN FRAME of Light Metal, Preferably Magnesium D, 4

U S Pat 2,545,277 (Hannah, La Salle——March 13, 1951)

This frame, developed for screen printing, consists of two parts: (1) a replaceable insert portion made of wood to which the screen carrying the print design is fixed, and (2) another (permanent) part made of four magnesium sections. According to Fig 1, wooden wedges (16) are introduced into the dove-tailed groove of the stable magnesium frame (10). The screen (17) carrying the pattern can be fixed with nails (19) on the wedges (16). These wedges can also be replaced by a rope (see Fig 2).

The advantage of this construction is that the metal frame will last for years and the wooden wedges can be easily exchanged. Then too the screen carrying the pattern can be rolled up and stored away, thereby saving considerable space. Wooden frames carrying the screen are often damaged by careless handling and also rapidly warp in moist air.

Among other references cited by the Patent Office:

USP 2,204,928 (1940—Oliver Un Filters Inc): a locking device for securing a piece of fabric (especially a filter fabric) in a grooved base member.

USP 1,892,268 (1932 — Flockhart): a screen stencil frame consisting of a grooved base frame and means for clamping the margin of the screen on it. The screen can be removed after use and stored in a minimum space.

USP 1,248,858 (1917—Higgins): a removable window screen of metal construction to replace the older wooden screens.

Reference is further made to Kessel's Ger P 658,350 of Sept 11, 1936. Here the screen frame consists of wood, reinforced by iron metal angles to prevent distortion in storage. This similar construction, however, is not made of separate metal and wood parts that can be disconnected after printing; this seems to be the essential characteristic of the present invention.

EXPEDITED PATENT SERVICE

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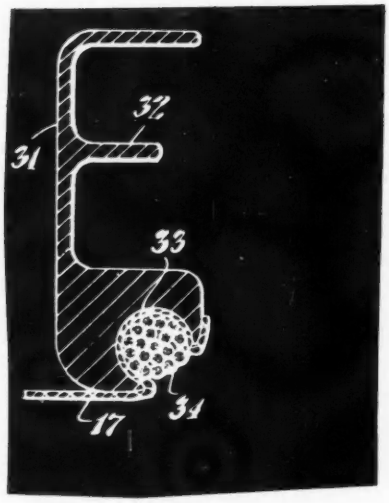


Figure 2—U S Pat 2,545,277

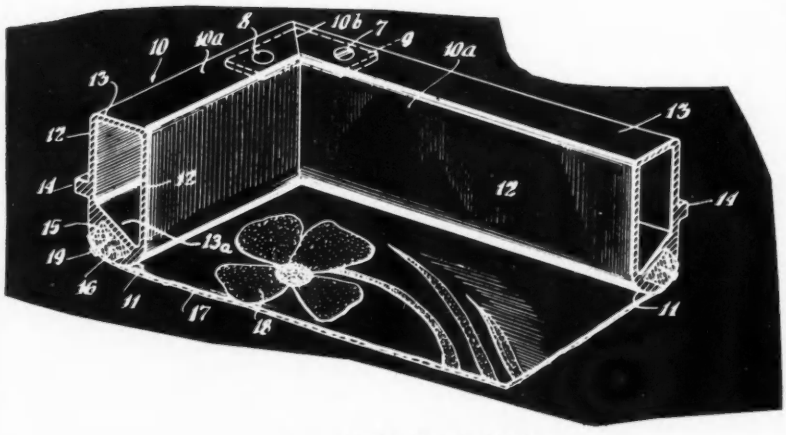


Figure 1—U S Pat 2,545,277

SHRINKPROOFING WOOL——Water Soluble Precondensates, Infrared Radiation A, 2, 04

U S Pat 2,545,450 (Pacific Mills——Dalton, Kaupin——March 20, 1951)

The inventors state that the use of resins in shrinkproofing wool is common practice. The results are said to be generally unsatisfactory with respect to poor softness when compared with the hand of the original fabrics. It is suggested that this harsh touch may be caused by concentration of the major part of the resin on the fiber's surface.

This invention proposes a solution to the problem by heating the resin-impregnated fabric homogenously and so rapidly that the precondensate instantly becomes very viscous. In this state migration within the fibers is substantially prevented and the distribution remains quite uniform throughout the entire material. This effect is achieved by infrared or radio-frequency radiation, which suddenly warms the wet fabric from surface to surface to about 140-212° F. The next (separate) step consists of polymerizing and curing the resin to 180-300° F by again using infrared lamps. The purpose of this is to avoid any uneven distribution that occurs in drying according to prior methods. An additional effect of this process is an increased affinity to acid dyes.

The resin precondensates having a low molecular weight during the impregnation step are methylolmelamines, optionally alkylated and combined with resin forming amines such as urea, thiourea, guanidine and the like. Formaldehyde split off by methylolmelamine during the first heating procedure combines with these amines to eventually give insoluble resins in the curing step.

Example: a wool fabric, predyed with 3% Alizarine Blue SE (C I 1053) and rinsed in such a way that some sulfuric acid is retained as a catalyst, is padded with 6%

methylated methylolmelamine, 2% urea and 2% trioxymethylene for 10 seconds at a speed of 15 yards per minute. The fabric, squeezed to a 60% pick-up is heated by intrared lamps to 180° F. Drying is then carried out on a tenter frame and is followe carried out on a tenter frame and is followed by curing at 300° F under the action of infrared rays. The results are found to be superior in shrinkproofness, i e, dimensional stability, in color fixation and fastness to perspiration compared with nontreated specimens.

Among other references cited by the Patent Office:

Reissue 22,566 (1944 — Cyanamid-Johnstone): alkylated methylolmelamines used for shrinkproofing.

USP 2,321,938 (1943—Johns Manville Corp): drying a coated board or the like by applying infrared rays on either side.

USP 2,248,696 (1941 — Interchemical Corp): dyeing with pigmented emulsions; an aqueous liquid—at least 20%—is emulsified in a pigmented oily (lacquer) phase.

USP 2,190,672 (1940—Bakelite Corp): preparing water miscible phenolaldehyde condensates, which employ a small amount of an alkaline catalyst, and reacting the components at pH values not above 10.

USP 2,121,006 (1938—Raduner): shrinkproofing fabrics with artificial resin solutions, drying and stretching to obtain the desired dimensions; curing in the stretched condition.

USP 2,845,322 (1932—Ajax Metal Co): coating metal sheets by covering with a thin metal layer and fusing by inducing a high frequency current in the surface.

While drying, heating, baking and even curing with infrared rays has frequently been described (cf, e g, *Rayon Textile Monthly* May 1945, 93 and Sept 1945, 122) the essential innovation disclosed in the present patent is in the application of the formentioned rays in two consequent steps: (1) precondensing the components to a viscous state to prevent migration, and (2) curing at higher temperatures.

PRINTING BLANKET——— Spliced Along a Line of Interfitted V-shaped Cuts D, 3

U S Pat 2,547,220 (Dewey & Almy Chemical Co——Merrill——April 3, 1951)

Customary endless blankets used in roller printing machines are butted together with the overlying ply covering the joint in the ply beneath. This joint is generally made in the top ply by a transverse butt splice only. This method gives irregular printing results because the working area is subject to a continuous strain by alternate compression and elongation; after some use the joint will separate, the splice will open and some water will be carried from the washing machine thereby making it useless for printing operations. The inventor is aware that alternative dovetails and dovetail sockets have been proposed for belts of sanding machines but even this construction is said to have failed in its application on textile printing blankets. Since the ends of the dovetails extend transversely to the blanket, they open in operation as easily as a transverse butt splice.

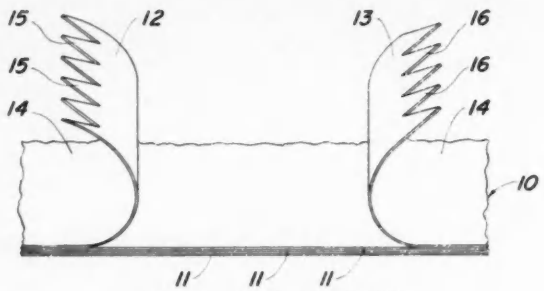


Figure 1—U S Pat 2,547,220

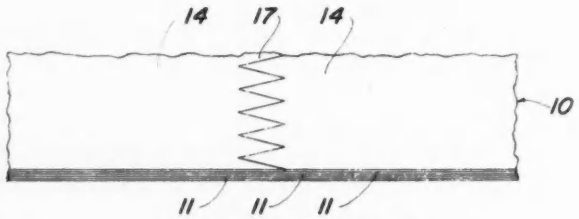


Figure 2—U S Pat 2,547,220

It has been found that the durability of the joint depends less on the tensile strength of the connection of the two ends than on the shape of the joints. The proposal in the present specification is to form joints entering the critical space (the "bite") between printing roller and compressive cylinder as nearly as possible along the axis of the blanket. Thus, as illustrated in the drawings, the joints are formed in the shape of long, narrow interfitted V's. Practically, the base of the "V" should be approximately ½ inch and the altitude of the triangle 2-4 times the length of this base.

Fig 1 gives a perspective view of the joints in the top ply and Fig 2 the plan view of the blanket after pressing and curing of the cuts (15) and (16). Line (17) becomes practically invisible.

Among other references cited by the Patent Office:

USP 2,391,731 (1945—Minnesota Mining): joining two portions of abrasive sheet material made of a backing sheet which is attached by adhesive to a metallic screen.

USP 2,336,084 (1943—Dayton Rubber Manufacturing Co): grooved wrapped belts with flat top and side surfaces of rubber inforced fibers. Other layers of rubber are super-imposed and fixed to form a joint of the same thickness as the respective layer.

USP 2,300,728 (1942—Goss): manufacturing "fabricated lumber", ie., boards connected by interfitting joints fixed with glue under pressure.

VAT DYEING with Heat Sensitive Dyes———Halogenates Added C, 4, 02

U S Pat 2,548,544 (American Cyanamid——Mecco——April 10, 1951)

Some vat dyes, particularly members of the anthraquinonedihydrazine group, exemplified by Indanthrene Blue GC, GCD (C I 1113), show a tendency of over reduction by excess hydrosulfite at elevated temperatures. Also, the reducing agent might possibly cause partial destruction of the dyestuff molecule under these conditions. These reduction-sensitive dyes consequently have to be dyed at lower temperatures, thereby precluding rapid dyeing methods that require higher temperatures to obtain sufficient penetration and levelness. Temperatures of 120° F and especially between 140 and 160° F, are quite generally dangerous when applied to one of these reduction-sensitive dyes. Other examples of these dyestuff types are mentioned, for instance, Indanthrene Brilliant Violet RK (C I 1135), Ponsol-Blue BCS (C I 1114), Indanthrene Brown R (C I 1151), Indanthrene Red K (C I 1162), Ponsol Green B (C I 1102), Cibanon Blue 3G (C I 1173), Caledon Violet RN (C I 1163), etc.

It has been observed that over-reduction at elevated temperatures can be avoided by adding to the dye bath or to the printing paste a soluble alkaline or alkaline earth metal halogenate, preferably sodium chlorate. The minimum amount of halogenate to be added to obtain the effect desired is given as ¼ of the weight of the dyestuff and the optimum ratio, 1.5—2 parts per one part dyestuff.

It might be assumed that this novel effect is due simply to a reduction buffering action

of the oxidizing agent; but oxidation can not be the only reason for this surprising behavior because other oxidants (inorganic or organic nitrates or organic nitrites) do not give improved results when applied in this process.

Example: three parts of Indanthrene Blue GCD (of an 18.5% pure dyestuff substance content) are blended with three parts sodium chlorate, wetted with NaOH and hydrosulfite as usual at 160° F, and dyed on 20 p cotton yarn for 15 minutes at the same temperature. A bright blue shade is obtained about 80% stronger and more reddish than a control sample in which the sodium chlorate is omitted.

References cited by the Patent Office:

USP 2,383,393 (1945—Cyanamid): using a quinone sulfonamide as a vat dye pasting agent.

USP 2,146,646 (1939—General Aniline): a vat dyestuff composition containing sulfobetaine derivatives as dispersing agents, e g, pyridinium hydroxypropene sulfobetaine.

USP 2,029,999 (1936—Ciba): printing pastes (of vats, azodyes and several other groups containing toluene sulfonamide or other sulfonamides) added to the press cake.

STRIPPING WOOL DYEINGS——Electrolytically Prepared Reducing Salt Solutions C, 1

Brit Pat 652,899 (Fabrics Research Lab Inc——Kaswell——May 2, 1951)

Stripping dyed wool with zinc or sodium formaldehyde sulfoxylate solutions is dangerous to the wool fiber's constitution since the radical action of the reducing agent partly breaks the cystine linkage and thereby fundamentally alters the material. Moreover, formaldehyde liberating agents impart a harsh hand to the fibers and impair their tensile strength.

According to the present invention, stripping of wool is effected by reducing water-soluble metal salts (especially those of Cr, Va or Ti) to the lowest state of valency by means of an electric current. These solutions act as strong reducing agents and the forementioned drawbacks are avoided in this operation. The stripping liquid, i e, the salt solution subjected to the action of the electric current, is withdrawn directly from the cathode of an electrolytic cell. In analogy to the electrolytic preparation of bleaching solutions obtained by electrolysis of common salt solutions, interposition of a porous diaphragm is necessary to separate the anodic and the cathodic regions. The current density is adjusted in such a way that reduction occurs at a rate at least as great as required for reoxidizing the ions in the subsequent stripping process. This method has the further advantage of maintaining the stripping power at the same level throughout the entire operation by recycling the solution. Thus no substantial loss of material occurs. It is possible to insert the fibers in the same cell where the electrolytical reduction is effected but the wool is perfectly stripped in a vessel where the stripping solution can be circulated while the retransformation of the oxidized salt solution to the low valency state is carried out in a separate cell.

The accompanying drawing illustrates the arrangement according to the preferred method. Va-, Ti- or Cr salt solution is introduced into cell (2). Cathode (12) and anode (10), connected with leads (16) and (14) respectively, are separated by the porous pot (8), which acts as a diaphragm. The reduced stripping liquid is conducted through (20, 22, and 58) into the stripping tank (4) and thereafter into reservoir (40) where it is again led to tank (2). Pipes and valves, shown in the drawing, permit controlling of the process by removal of excess stripping liquid or recycling of it through tank (2) prior to further use.

Stripping liquids can be prepared from vanadium pentoxide, titanium sulfate or chromium trioxide by dissolving these substances in sulfuric acid and reducing them to the lowest state of valency. Wetting agents not affected by the reducing process may be added to accelerate the stripping action. The optimum current density is 0.0087—0.012 amperes per cm^2; the stripping liquid is preferably used at a temperature of 85-90° C. A full description of this method will be found in the Northern New England Intersectional Contest Paper, AATCC, *Am Dyestuff Reptr* 37, P119, 1948.

At almost the same time, the inventors were granted USPat 2,549,099, which is parallel to the above.

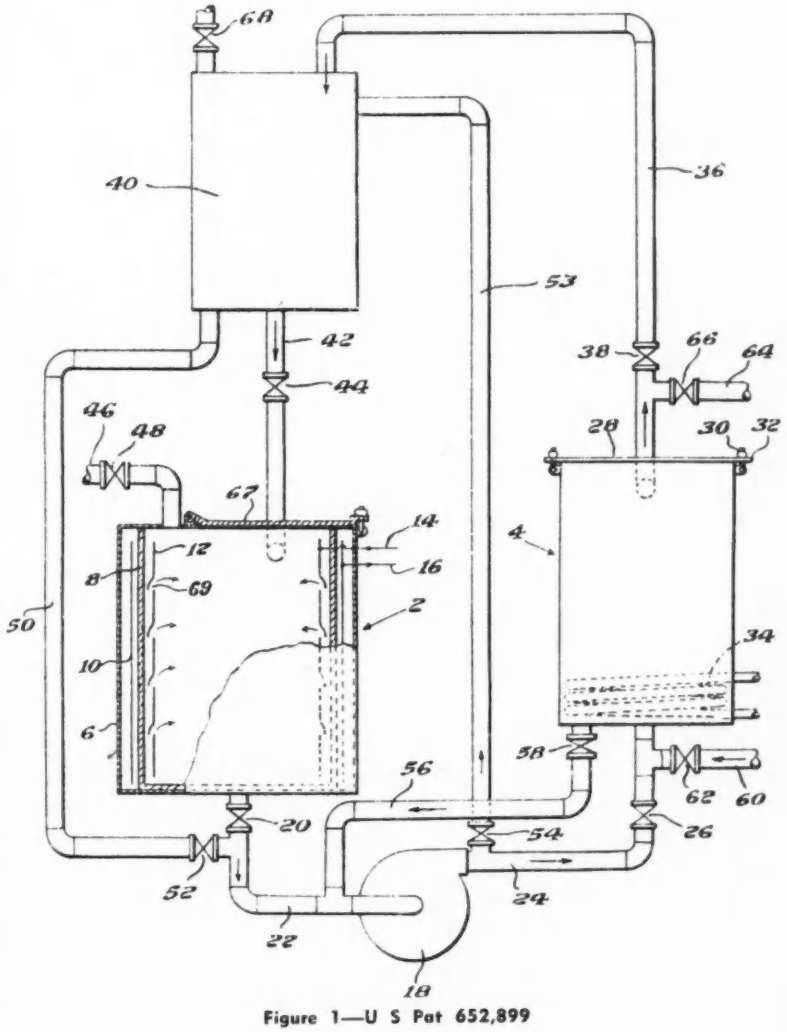


Figure 1—U S Pat 652,899

ABSTRACTS

Notes on Silk Dyeing.

A G Tyler, *Brit Rayon & Silk J* 27, No 320, 57-9; No 321, 63-4; No 322, 61-2; No 323, 58, 60; No 324, 58-9 (1951).

Although for the main part silk dyeing is carried out on silk from which the gum or sericin has been completely removed, a certain amount, in the form of yarn, is dyed while all or part of the gum is still present on the fiber. Silk in this condition is referred to as "ecru" or "hards," and the only preparation necessary is a short treatment in warm water at approximately 140° F. Even this mild treatment may remove too much gum from some qualities, particularly of Japan silk. Under these circumstances it is necessary to apply a hardening treatment in order to render the gum more insoluble, and this may be obtained by the use of formaldehyde.

Dyeing of hard silk is carried out in acid liquors with easily levelling acid dyestuffs, the normal dyeing temperature being 100-110° F. It is of interest to note that in dyeing gum silk the gum is dyed to a much deeper shade than the silk fiber itself.

A limited range of vat dyes may also be dyed on gum silk if it is previously hardened with formaldehyde.

If a larger amount of gum is removed from the fiber—usually in the region of a quarter of the whole—the silk is known as "souple." The process of soupling consists of swelling the gum so that the requisite proportion is removed, and then hardening the remainder so that it is not readily removed during the dyeing operations which follow. The gum is swollen by soaking in a soap solution containing 6 g/l at 100° F. The hardening operation consists of a hot treatment in an acid bath.

Souple silk is dyed with basic and certain acid dyes at a maximum temperature of 160-165° F in a bath containing "boiled-off liquor" broken, or acidified, by sulfuric acid.

Silk which has been completely degummed or "boiled-off" may be dyed with a much greater range of dyes. The classes of dyestuff which may be applied from a sulfuric acid-boiled-off liquor include the majority of the basic colors, a large number of the level-dyeing acid colors, together with a smaller number of the faster acid colors. The wet fastness of basic dyestuffs on silk is in general fairly good, and it can be considerably increased without unduly flattening the shade by an after-treatment with tannic acid and tartar emetic.

Acid milling dyes are usually applied to boiled-off silk from a Glauber's salt bath, either neutral or acidified with acetic acid. The direct cotton dyestuffs are extremely useful for augmenting the shades obtainable by the use of acid milling dyes, and may be dyed in similar ways. Besides the use of direct dyestuffs as such, the various after-treatments which are normally given to them on cellulosic fibers, particularly diazotizing and developing and treatment with formaldehyde, may also be given on silk.

Mordant dyes were formerly used on silk to a considerable extent, but now only for certain specific shades. Alizarin dyed on an aluminum mordant yields red shades of excellent fastness to light and washing. The mordanting operation consists of soaking the silk overnight in a solution of basic aluminum sulfate, followed by fixation with sodium silicate. Chrome mordants are seldom used today, the most common being a concentrated solution of chromium chloride. Dark brown shades are occasionally produced in this way.

Dyeings of fastness approaching that of the mordant dyestuffs are obtained by the use of the metalized dyes, which are especially useful for dyeing washing styles on piece goods.

Silk may be dyed from the strongly alkaline baths necessitated by the use of the sulfur, vat and azoic colors, as long as suitable precautions are observed (e g, by the use of protective colloids).

By far the most widely used method of applying sulfur colors to silk is the Lodge-Evans process, in which the dyestuff is first dissolved in a solution of sodium sulfite, and then reduced by hydrosulfite.

Vat dyestuffs may be dyed on silk by the normal methods of application to cellulosic fibers, so long as care is taken that the quantity of caustic soda required for good reduction and solution of the leuco dyestuff is not exceeded and that a suitable protective colloid is added (e g, glue or sulfite cellulose liquor). Most of the silk dyed with vat dyestuffs is dyed in yarn form, but silk that is dyed with the vat leuco esters is processed usually in the piece.

The normal method of application of the vat leuco esters to silk is from a weakly acid bath containing acetic acid and sodium sulfoxylate formaldehyde. The dye-bath is started cold and gradually raised to 180° F. The shade is developed by treatment with a strong oxidizing agent, either bichromate or ammonium persulfate, and sulfuric acid. Nitrous acid cannot be used because it would attack the amine groups in the silk.

The general methods of applying the azoic colors to silk are the same as those used on cotton and rayon, with the additional precautions necessitated by the chemical nature of the fiber. The alkalinity of the naphthol bath must be reduced to an absolute minimum, and a protective colloid should also be employed, the most common being sulfite cellulose liquor. Most silk dyed with azoic colors is processed in yarn form, often in the open vat, the impregnating bath being made up at a temperature of 70-80° F. The yarn is worked in this liquor for 20-30 minutes, and then the naphthol is exhausted by the addition of common or Glauber's salt. After hydro-extraction, the yarn is developed in a bath containing a diazotized amine, sodium acetate, and common salt.—WHC

Protection of Paper and Textile Products from Insect Damage.

S S Block, *Ind Eng Chem* 43, 1558-63, July, 1951.

Unlike the farmer who is constantly at war with insect enemies, the manufacturer of finished products often tolerates insect damage. More recently, however, manufacturers have shown the desire to correct this situation, provided practical solutions to their problems can be obtained. This work deals specifically with the prevention of the destructive activities of American cockroaches as applied to sized and glued textiles and paper products and in the penetration of paper packages.

It was found that starch sizing was much more difficult to protect than gelatin or gum arabic. Inert, water-insoluble coatings of sufficient thickness prevented attack of sized surfaces. Of 68 chemicals, only mercuric chloride and the alkali thiocyanates gave complete protection. Treating food-containing paper packages with saturated solutions of ammonium thiocyanate, ammonium nitrate, or magnesium chloride prevented penetration by starved roaches.

Taste repellents may be recommended where the use of insecticides is impractical or undesirable. Examples are in wrappers and containers for foods, and in sizings and glues for products that come in direct contact with the person using them.

In practical applications of repellents, certain physical properties appear to be important. One of these is water solubility. For example, the copper thiocyanates are not repellent but the iron, sodium, potassium and ammonium salts, which are very soluble in water, were found to be repellent.

Furthermore, those chemicals which are hygroscopic or deliquescent proved to be more repellent than those which do not possess that property.—WHC

Soiling and Soil Retention in Textile Fibers. Cotton Fiber—Grease-Free Carbon Black Systems.

J Compton and W J Hart, *Ind Eng Chem* 43, 1564-9, July, 1951.

A fundamental knowledge of the specific properties of cotton fibers, yarns and fabrics responsible for the formation and stability of soil-fiber complexes is essential to the development of treatments designed to increase soil-resistance and ease of soil removal.

This investigation is concerned with the interaction of cotton fibers, reduced in length to 0.1-1 mm to avoid variables arising from yarn and fabric structure, with aqueous dispersions of carbon black soils in the primary particle size range of 10 to 100 microns under various conditions.

An attempt is made to determine the bonding mechanisms of the permanent soil-substrate complexes of carbon blacks and cotton fibers, and to evaluate the factors affecting them by studying their formation and stability in various systems. It is assumed that the two possible modes of bonding of the complexes are sorption and micro-occlusion.

It was found that surfactants and electrolytes affect the formation of such soil-fiber complexes, but not the stability of these complexes, once formed.

The factor primarily responsible for the formation and stability of the soil-fiber complexes in the presence of water was found to be micro-occlusion, or geometric binding, of the soil particles by the microscopic and submicroscopic crevices in the fiber surface. —WHC

The Design of Fading Lamps

J Boulton and J C Guthrie, *J Soc Dyers Colourists* 67, 190-2, April, 1951.

(This article was sponsored by the Fastness Tests Co-ordinating Committee of the British Society of Dyers and Colourists).

Some features of the past designs of fading lamps have been unsatisfactory, and a really efficient instrument probably does not exist, though some are better than others, largely on account of convenience of operation. It may, therefore, be of interest to put down some basic considerations:

(1) With any kind of known equipment it is not possible to simulate sunlight fading with any degree of precision. The essential use of a fading lamp is for rapid comparative tests.

(2) The practice of awarding "fading lamp hours", e g, by docketing samples with the number of hours they resist exposure to an artificial light source, is to be strongly deprecated. It connotes equivalent behavior in, and control of, instruments of the same make at different times in different places, and these conditions do not exist.

(3) Any fading machine should be put out simply and solely as a means of comparing a given pattern with an accepted standard pattern, and results must be stated in terms of the behavior of the standard at the time of exposure of the patterns.

(4) It is not possible to "standardize" exposures by the use of a single dyed standard whose exposure at any times to any lamp would give a factor for fading activity that could be applied to an "observed" fading time to give a "corrected" fading time. The behavior of a colored test paper, say, cannot be related at one and the same time to that of variously dyed wool, cellulose, nylon, leather, and so on.

(5) With these conditions for the use of fading machines in mind, the authors consider that the outstanding features requiring attention in designing a lamp are:

(a) Temperature control
(b) Humidity control
(c) Relative movement of light source and exposed specimens
(d) Nature of light source
(e) Measurement of energy emitted by the light source.

The authors then give detailed comments based on their experience with the latest model of an American instrument (obviously the Fade-Ometer) and one existing British instrument. They urge that every fading lamp be equipped with temperature and humidity controls, as well as a light integrator to check the variable output of the lamp. They also recommend that the controls as well as the samples should preferably be stationary on the circumference of a circle with the light source rotating about its axis at the center.

They believe that the carbon arc is probably the best light source available at present, but think that consideration should be given to the possible use of the Siemens gas arc (a quartz discharge tube filled with xenon, argon or krypton) or tungsten lamps provided with appropriate filters.—WHC

Natural Dyewoods on Nylon Yarn

H R Tisdale, *Rayon & Synthetic Textiles* 32, 59-60, 62, June, 1951.

When in 1939 and 1940 nylon fibers began to appear, a considerable amount of laboratory work was instituted to find the best method to use in the dyeing of nylon with natural dyewoods. At that time nylon was used for sewing thread, and we were trying to duplicate the shade of Logwood Black on real silk. However, the real silk formula, using a mordant of red iron liquor, followed by a separate bath with Hematine, did not give good results on nylon. After exhaustive trials it was found that a very simple formula, using 1 per cent of bichrome and 1 per cent of sulfuric acid, sufficed for a mordant. After rinsing, the nylon was dyed a beautiful black with an oxidized Logwood or Hematine, and in 1940 commercial lots of nylon yarn were dyed.

Nylon yarn dyed by this formula in 1940, when tested in 1948, showed a loss of 10 per cent in tensile strength. To determine whether the nature of the dyestuff used would have an effect on the strength of the dyed yarn, comparative dye tests were made with Logwood dyed both on chrome mordant and after-chromed and with and without addition of Fustic; three other dyewoods, Fustic, Hypernic, and Osage Orange; and four methods of dyeing black with synthetic dyes: a combination of acetate navy blue and yellow, an acetate developed black, an acid black, and an after-chromed black. All dyeings were exposed to summer sun for 80 hours and were then tested for tensile strength.

Dyeings showing the least loss were the combinations of Logwood with Fustic and the combination of acetate navy blue and yellow. Logwood alone was almost as good. The other three black dyeings, all synthetic, showed materially greater loss in strength.

The author makes recommendations for dyeing Logwood by the two methods (chrome mordant and after-chromed). He considers that the use of the natural dyewoods tends to preserve the strength of the nylon fiber when exposed to outdoor influences.—WHC

The Measurement of Stiffness in Textile Fabrics

N J Abbott, *Textile Research J* 21, 435-41, June, 1951.

Stiffness is one of the characteristics of a fabric which goes into making up that important quality known as "hand". When a person who is accustomed to handling textiles feels a fabric, he is able to form a definite opinion as to whether he considers it stiff or soft. It should be possible, then, to use this "subjective evaluation" as a reference standard of stiffness with which to compare the evaluation resulting from a laboratory test. This can only be done, however, if the person making the subjective evaluation can distinguish between two fabrics of nearly the same stiffness, and provided a number of such evaluations, made by different people, agree.

In Part I of this paper the subjective evaluation of stiffness is used as a standard with which to compare the results obtained from five different laboratory methods of measuring stiffness. Measurements were made on a range of 19 fabrics of varying

fiber content, weave, and weight. The results indicated significant correlation in four of the five methods.

The five test methods which were compared were as follows: (1) the Cantilever Test (Pierce); (2) the Heart Loop Test (Pierce); (3) the Flexometer (Schiefer); (4) the Planoflex (Dreby); (5) the Drapeometer (M I T).

The test was repeated with a new range of eleven fabrics, with approximately the same results. The Pierce cantilever test was selected as being the most convenient to carry out in the laboratory, and at the same time giving good correlation with the subjective estimate. Part II describes a more detailed examination of certain aspects of this test.

It is proposed that the best basis for comparison of fabrics is measurement made at a standard angle of dip, 41°, at which angle the bending length is one-half the length of overhang. It is shown in Part I that the best measure of stiffness is the flexural rigidity of the fabric, which is its weight per unit area multiplied by the cube of its bending length.—WHC

Book Review

Chemikalienkunde

Fuer den Textilveredler
V Band des Handbuchs der Faerberei
Albert Schaeffer
674 pages: 54DM
Konradin-Verlag, Robert Kohlhammer, Stuttgart
($13.25 Stechert-Hoffner, Inc, New York)

In the largest and final volume of his *Handbook of Dyeing* with the specific title of *Information About Chemicals for the Textile Finisher*, the indefatigable Dr Albert Schaeffer of Hoechst has brought to a close his ambitious series of five books written to instruct the mill chemist, the dyer, the finisher, the supplies chemist, and the student. Although Schaeffer's Vol II requires a considerable theoretical knowledge of chemistry for full appreciation, Vol V under consideration is written for the practical reader who wants to know what products or chemicals to use for specific purposes, what they are chemically, what are their properties, what they can do and where he can get them.

As these books are written in German, they are of interest only to those who have some knowledge of this foreign language. But since, as Schaeffer himself points out, Vol V is "avowedly a reference work", a person who reads a translating dictionary more than the book before him will nevertheless find this tome of interest when he seeks brief and trenchant information about a particular product or chemical. Furthermore, since much of the material is in the universal language of structural formulas, numerical data and literature references, a fluent knowledge of a foreign language is not so important. Schaeffer's simple and lucid style of writing and arrangement of material are further advantages.

The nearly 600 chemicals treated by Schaeffer include most of those of interest to the textile chemist except finished dyestuffs; naphthols, color bases, fast color salts and whitening agents, however, are covered. Complete directions for dissolving the different naphthols are an added feature. Chemicals have been divided into two large groups, inorganic and organic, and within each of these they are arranged according to chemical considerations and not according to application. They include, however, representatives of all of the kinds of chemicals necessary for the uses given in the "Index of Textile Chemical Specialties" of the current *AATCC Technical Manual and Year Book*, and they include also other substances of interest to the textile industry as well, such as metals, heavy chemicals, oxygen and water.

The most important consideration for convenience in a book of reference is an extensive index. The one here has been divided into two parts, the first part containing common chemical names and uses under which items can be found, and, the second, trade names from American as well as European sources. Where several page numbers follow an index heading, the most important is in boldface. The omission of compounded mixtures greatly simplifies any list of textile chemicals without detracting from its usefulness.

For each of the items in the book under the full chemical name are given the structural formula (if organic), the common name, the molecular weight (if available), the commercial names and manufacturers (as many as 67 for the Nacconol NR Type of detergent), the properties, uses, literature references and references to the first four volumes of the *Handbuch*; patent references, however, are entirely lacking. In his references to the literature, Schaeffer has been rather partial to American, German and English sources but has also included many references to Russian and French books and journals. The student will find many interesting bits of chemistry and structural formulas in various places, such as, among others, diazotization, antidiazotates, coupling, resin formation, cellulose esterification, cellulose ethers, formation of aniline black, and water softening. For convenience the book contains also a list of technical journals, a list of atomic weights, a list of indicators, a list of buffer solutions with compositions, an explanation of Andrew's Cross for calculating the reduction of higher concentrations to lower, tables of equivalents for different units of measurement, and a brief discussion and tables of the physical properties of about 25 fibers.

The book is well bound with an all-linen cover and is printed on well-bleached book paper of standard quality and with an English (semimatte) finish. Editing and proofreading have been so careful that few errors are evident. The words "Houghton" (p 228), "Cyclopon" in several places, "Entomology" (p 460), and "Leather" (p 460) are the only misspelled words that were noticed. On p 432 is a stray valence. Schaeffer has avoided some of the errors in the formulas of naphthols and fast color bases that have crept into other recent books, the reviewer having compared many of the formulas with his own records. Emulphor ON (GDC), however, is mistakenly called an ester rather than an ether of polyethylene glycol.

To complete his review, the writer must list a few omissions that he considers important. In the discussion of metals, the resistance of iron to alkali and sulfide and the significance of this resistance in the construction of textile equipment are not discussed. The lack of resistance of Monel metal to sulfide and to linen kier liquors is not mentioned. Surface-active phosphates have not been covered, nor the use of dextrine as a protective agent against the overreduction of vat dyes. The use of titanous sulfate and the use of electrolysis in stripping have been overlooked. In the discussion about the use of inorganic salts in dyeing there is no reference to the AATCC research about the substitution of common salt for sodium sulfate. Like most Germans and still too many Americans, Schaeffer fails to distinguish between a cubic decimeter and a liter, a liter being actually 1.000027 cubic decimeters. Even though cc and ml are practically identical for ordinary commercial work, theoretically they differ; and recently trained American chemists are cognizant of the fact. Under benzene the author fails to point out that toluene is far less poisonous than benzene and should be substituted for the latter wherever possible in experimental procedures.

Although any reviewer can find gaps in a book that he would like to see filled, the textile finisher and chemist will find a tremendous amount of useful and easily accessible information crammed into Volume V.—CZD

NEWS

• Mona Industries, Inc Establishes in Paterson

Dr Karl Heyman, W O Schlimbach and R H Sommer have severed their connections with the Kearny Manufacturing Co, Inc, to take over a Paterson, N J, chemical factory. They will continue to manufacture and market a complete line of textile finishing chemicals as well as an additional line of yarn conditioning liquids under the name of Mona Industries, Inc.

George Westwater, lately exclusive sales representative in New England for Kearny, will also join the new company in the same capacity, and, in addition, will serve as a consultant engineering assistant in regard to textile conditioning machine problems. Helmut Sonntag, former service engineer and machine designer for Kearny, will serve as a consultant engineer.

The new company will present a line of all-stainless steel yarn conditioning machines shortly, it is reported.

Sales representatives for Mona Industries, Inc, in Canada, will be Messrs Fawcett & Co, Toronto, Ont.

• Proctor & Schwartz Names Defense Projects Engineering Group

As part of the overall Mobilization Plan which has been in operation for over a year at Proctor & Schwartz, Inc, Philadelphia, Pa, a Defense Projects Engineering Group has been named.

Members of the group have been selected from the Sales Engineering Department and will function under the guidance of Albert G Blank, newly-named assistant sales manager of the Company's Dryer Division (see "Names in the News").

The purpose of the group is to make available Proctor engineers to confer with engineers, physicists and technicians of the Armed Services, as well as with other companies having defense contracts, and to determine how best to integrate Proctor & Schwartz development, engineering and manufacturing facilities into the various defense efforts of these agencies or companies.

• $15,000,000 Solvay Expansion at Baton Rouge

Clyde A Kitto, manager of the Baton Rouge soda ash plant of the Solvay Process Division, Allied Chemical & Dye Corp, announced on July 24 plans for the third expansion of the Louisiana establishment.

Cost of necessary buildings, equipment and facilities will reportedly exceed $15,000,000, including certain new equipment at the company's Prairie du Rocher, Illinois, limestone quarry, which supplies necessary stone for the Baton Rouge plant's chemical operations.

The J C White Company of New York, N Y, has been awarded the construction contract, Mr Kitto stated. Representatives of the concern are expected to arrive in Baton Rouge within a short time to complete plans for the work.

Announcement was also made that Solvay has opened a temporary office at 1742 North 21st Street, Baton Rouge, to handle construction, engineering and purchasing details in connection with the project.

• Chemstrand Registers Acrilan Trade Name

Chemstrand Corporation announced late last month the registration of the trade name "Acrilan" for its major new acrylic fiber, the principle characteristics of which are reported to be warmth-without-weight, softness-to-the-touch, moth resistance, quick drying, shrink resistance, crease resistance, and resistance to outdoor deterioration.

Full production of Acrilan at an annual rate of 30,000,000 pounds will begin next year, it is reported, at a plant now in construction near Decatur, Ala. Large scale pilot-plant production is now under way at Marcus Hook, Pa.

Indicated uses are in apparel and furnishings such as suitings (Acrilan blends with wool or rayon), blankets, mouton, socks, gloves, sweaters; outdoor applications such as awnings; and industrial uses such as acid-resistant work clothes.

COMING EVENTS

AMERICAN ASSOCIATION OF TEXTILE TECHNOLOGISTS

Meetings: September 12, October 3, November 7, December 5 (Builders Club, New York).

AMERICAN CHEMICAL SOCIETY

Meetings: September 3-7 (New York, N Y).

AMERICAN OIL CHEMISTS' SOCIETY

Fall Meeting: October 8-10 (Edgewater Beach Hotel, Chicago, Ill).

AMERICAN SOCIETY FOR TESTING MATERIALS

Spring Meeting and Committee Week, March 3-7, 1952, Cleveland, Ohio.

Annual Meeting, June 23-27, 1952, New York, N. Y. (The biennial Apparatus and Photographic Exhibits will be held in conjunction with this meeting).

AMERICAN STANDARDS ASSOCIATION

33rd Annual Meeting: October 24, Waldorf-Astoria, New York, N. Y.

COUNCIL OF THE INTERNATIONAL UNION

Meeting: September 14-15, Washington, D. C.

FIBER SOCIETY

Meetings: September 13-14 (Swampscott, Mass.); April 16-17, 1952 (Clemson House, Clemson, S. C.)

INTERNATIONAL CONGRESS OF PURE AND ALLIED CHEMISTRY

Meetings: September 10-13 (Statler, and nearby hotels, New York, N. Y.)

NATIONAL ASSOCIATION OF COTTON MANUFACTURERS

97th Annual Meeting: September 13-14 (New Ocean House, Swampscott, Mass).

NATIONAL ASSOCIATION OF TEXTILE MACHINERY MANUFACTURERS

Exhibit of American Textile Machinery, April 26-May 1, 1954, Atlantic City Exhibition Hall, Atlantic City, N. J.

NATIONAL STANDARDIZATION CONFERENCE

2nd Annual Meeting: October 24, Waldorf-Astoria, New York, N. Y.

NEW YORK BOARD OF TRADE

26th Annual Dinner of the Drug, Chemical and Allied Trades: March 6, 1952.

26th Annual Meeting: September 21-22, Shawnee-on-Delaware, Pa.

SOCIETY OF PLASTIC ENGINEERS, INC.

January 16-18, Edgewater Beach Hotel, Chicago, Ill.

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES

Luncheon Meetings—Hotel Commodore (September 12, October 10, November 14).

Annual Meeting and Dinner—Hotel Commodore (December 11).

TEXTILE RESEARCH INSTITUTE

Annual Meeting, Nov. 8-9.

TIC DELEGATES VISIT ICI DYEHOUSE LABORATORIES, MANCHESTER, ENGLAND

Shown below are some of the delegates from the Textile Institute Conference visiting the Dyehouse Laboratories of Imperial Chemical Industries Limited at Hexagon House, headquarters of the company's Dyestuff Division, on May 28th.

At the Main Entrance to Hexagon House

1st Row (l to r): G O Mitchell, assistant chief colorist, ICI Ltd, Dyestuffs Division; C Norris Rabold, Erwin Mills, Inc, AATCC president; Mrs Gordan D Pratt, wife of the sales division manager, Canadian Industries, Ltd, Montreal; Mary L Rollins and Ruby K Worner, Southern Regional Research Laboratory, U S Dept of Agriculture; Mrs A G Ashcroft; G S J White, chief colorist, ICI Ltd, Dyestuffs Division; E C Pfeffer, vice-president research, Cluett, Peabody & Co, Inc.

2nd Row: R J Smith, assistant chief colorist, ICI Ltd, Dyestuffs Division; R Levison, assistant director of research, Alg Kunstzyde, Unie, Holland; Dr A G Ashcroft, director of research and development, Alexander Smith & Sons Carpet Co; Dr A F Tesi, asst to technical director, Celanese Corp; W D Appel, chief of Textile Section, National Bureau of Standards, Washington; Dr T Vickerstaff, assistant chief colorist, ICI Ltd, Dyestuffs Division.

3rd Row: Dr C O Werner, Standards Dept, American Viscose Corp; Dr J M Lambert, research physicist, General & Film Corp; Mrs R Levison; Mrs A F Tesi.

4th Row: J Cyrot, Institute Textile de France; Leonard S Little, textile consultant, chairman of General Research Committee and Executive Committee on Research, AATCC; M Friedlaender, director, Textile Industry Group H/Q, Yugoslavia; A G Cuthbert-Smith, Overseas Sales Department, ICI Ltd, Dyestuffs Division; Mr Madaras, Yugoslavia.

L to r: Dr A F Tesi, Barbara Brown (Publicity Dept), E C Pfeffer, J. Cyrot, Dr A G Ashcroft, G S J White, and R Levison during a break for coffee and discussion.

Rayon and Nylon Laboratory

L to r: R Levison, H Hadfield (Dyehouse), Dr C O Werner, Dr. A G Ashcroft, and Dr A F Tesi discuss the dyeing of nylon.

• NPA Acts to Guard Pile-up on Orders for Three Chemicals

To guard against a pile-up of defense-rated (DO) orders on a few producers of chrome yellow, chrome orange and phenol formaldehyde resin, the National Production Authority last month acted to assure equitable distribution of these orders throughout the industry.

The latest amendment to NPA Order M-32 adds the three chemicals to schedule A. Under the order an individual producer of any of the three is permitted—but not required—to refuse DO orders which would take more than specified percentages of his total production of that chemical. These are: chrome yellow, 30 percent; chrome orange, 30 percent; phenol formaldehyde resin used with filler, 35 percent; and phenol formaldehyde resin used without filler, 45 percent.

In addition, a 15-day lead time is required for phenol formaldehyde resin orders to producers.

A purchaser who has a rated order refused by one producer must go to another producer who has not received enough DO orders to meet the required percentage. NPA states that they will assist purchasers unable to find a supply.

Several other chemicals already have been put under M-32 control, including barium carbonate, melamine and melamine-containing compounds, several types of anthraquinone vat dyes, carbon tetrachloride, methylene chloride, perchlorethylene, Freon 11, Freon 12, Freon 22, DDT, and ethyl cellulose.

Further information may be obtained at Department of Commerce field offices.

• Mathieson to Exhibit HTH Soda Bleach Mix

Mathieson Chemical Corporation will exhibit their new HTH Soda Bleach Mix at the American Institute of Laundering Convention at the Stevens Hotel, Chicago, Ill, from October 19-21. All ingredients of the new bleach have been combined into one unit.

Also on display will be Mathieson's regular HTH Bleach and two new complementary products, the HTH Make-Up Tank in which the solution is mixed, and the HTH Solution Pail used to transport the mixed solutions.

A E Wennerstrom, J K Moorhead, J L Pickens, W McCain and H D Watson will be in attendance.

• DAC Dallas Expansion Plans Revealed

W H Evans, Diamond Alkali Company's general manager of silicate operations, revealed plans last month for another expansion of its silicate of soda plant in Dallas, Texas, the fourth within ten years.

The new project, at a reported cost of several hundred thousand dollars, calls for the installation of a large furnace to supplement the output of three smaller ones now in operation. The present furnace building will be remodeled to accommodate the expanded facilities.

Full production under the new facilities is expected to be obtained early in 1952.

• Polyvinyl Chloride Resin Committee Withholds Recommendations

Recommendations on the type of regulation preferred by members of the Polyvinyl Chloride Resin Industry Advisory Committee were withheld following their July 12th meeting pending Congress' action on control legislation for the coming year, though proposals for a tailored regulation were discussed with OPS officials.

Up to that time the industry had been pricing under the General Ceiling Price Regulation (GCRP), and committeemen reported no hardship under it because the price of their products had been fairly steady and adjustments had been made prior to the freeze.

Committeemen indicated their industry would experience some rollbacks and roll forwards under the provisions of the Manufacturers' General Ceiling Price Regulation, CPR 22, to which they are subject, but up to June 30 manufacturers had not instituted it. They stated that their industry customarily sold at substantially uniform prices and the effect of CPR 22 would be to disturb this uniformity.

The possibility of adopting an industry-wide cost adjustment factor under the provisions of SR 2 to CPR 22 was discussed in order to give a uniform percentage adjustment of their GCPR prices. It was estimated the effect of this would be to give the entire industry prices at or close to their present levels. Before reaching a final decision, however, the committeemen decided to study the application of this devise and the type of information they would have to supply OPS to develop such a factor, and weigh their conclusions against the details the recently-extended price controls by Congress.

It was recommended that the polyvinyl chloride resin industry be defined by OPS as including polyvinyl chloride and all polyvinyl chloride copolymer resins having essentially the same use, the copolymers containing 50% or more by weight of polyvinyl chloride, sold in the forms of resins and latices and compounded products in powder or granular states, but not including other forms such as film, sheets, rods and tubes.

Members present included George C Miller, Bakelite Division, Union Carbide & Chemical Corp; Harold M Parkesian, Naugatuck Chemical Division; David Plumb, Monsanto Chemical Co; W C Goggin, Dow Chemical Co; A I Brandt, B F Goodrich Chemical Co; F G Groton, Firestone Plastics Co; and Herman Thies, Chemical Division, Goodyear Tire & Rubber Co.

NAMES IN THE NEWS

• Gaugler Elected MCA Vice-President

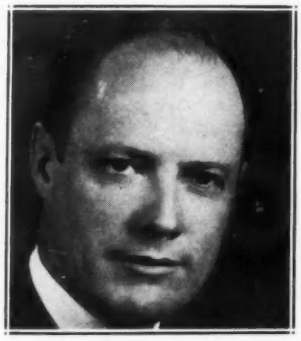
RAYMOND C GAUGLER, president of American Cyanamid Company, was elected vice president of the Manufacturing Chemists Association at a recent meeting, succeeding LEONARD T BEAL, who retired from the post. Mr Gaugler has long been active in MCA activities, which are aimed at promoting the interests of the chemical manufacturing industry.

• PC&C Forms Fine Chemicals Division

With the formation of a new Fine Chemicals Division, the Pittsburgh Coke & Chemical Company, Pittsburgh, Pa, is setting up a manufacturing program to include a selected range of dyestuffs, pigments and intermediate products, pharmaceutical intermediates, textile auxiliaries and other chemicals.

Dr L D Barrick will serve as manager of the new division with R M Locke as assistant manager.

Dr Barrick has had wide production, research, development and engineering experience in the fields of petroleum chemicals, dyestuffs, intermediate products, pigments and general organic synthesis. He has worked with Gulf Oil Company, General Aniline & Film Corporation, and as a consultant. During the past four years, he served as chemical director of Arnold Hoffman & Company, Inc, Dyestuff Division, in charge of research development and production.



Dr L D Barrick

R M Locke

Mr Locke served as technical director of the dye plant for Arnold, Hoffman & Company, as colorist at General Aniline Works, Grasselli, N J, and as group leader of Application Section for General Aniline & Film Corporation at Easton, Pa. In his new position at Pittsburgh Coke & Chemical, he will supervise sales, technical service and sales service, as well as aiding with production in the Fine Chemicals Division.

• GAF Changes and Promotions

Six employees of the Grasselli Works Division, General Aniline & Film Corp, Linden, N J, assumed new posts in July.

DR CLARENCE H BUURMAN has been named chief area chemist, Sulphur Colors and Textile Auxiliaries Area; ROBERT T WALKER was appointed Ansco production supervisor, Process Development Department; and ROBERT L KELLY has been named production supervisor in 53 Building, Vat Colors Area. SIGMUND STRENKOWSKI, ROBERT M CAPLIN and ANTHONY COLANERI have been promoted to staff accountants.

Dr Buurman, formerly supervisor of Ansco production and the chemical storeroom, joined GAF as a research chemist in 1941. Mr Walker came to Linden in 1946. Mr Kelly came to General Aniline in 1950, after nine years with the U S Rubber Company. The new staff accountants have had service with the company as follows: Mr Colaneri, 18 years; Mr Strenkowski, 11 years and Mr Caplin, 3 years.

• New ACC Appointments in Personnel, Plastics Departments

DR GORDON P WHITCOMB has been named assistant personnel director of the American Cyanamid Company, where his duties will include supervision of the company's personnel relations with colleges and universities. Dr Whitcomb, who joined ACC in 1939, is succeeded in his previous post of college relations representative by DR FRANK H HURLEY, former dean of men at Reed College.

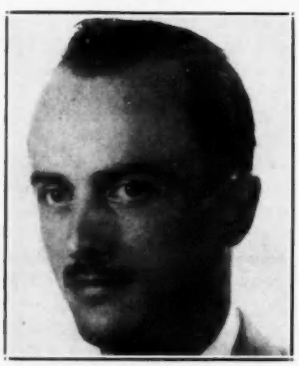
Meanwhile, the Company's Plastic Department has announced expanded technical service for users of Laminac Polyester Resins in the Midwest. The Department has divided the former territory into two areas with HENRY DUTOT assigned to Ohio and southwestern Michigan, and IRVING SCHUPP to the balance of the Midwest.

Mr Dutot, who has been with the company since 1935, spent eleven years working with polyester, melamine and urea resins. He dealt with special sales service problems for a time and was later made Cyanamid's technical representative for melamine and urea molding compounds in the Ohio area.

Mr Schupp joined the company in 1942. Since 1945, he has devoted all his activities to Laminac Resins, including work on resin evaluation, product and process development, and special sales-service calls in the field.

Mr Dutot will make his headquarters in Cleveland, and Mr Schupp, in Chicago.

Henry Dutot



Irving Schupp

• Four New Chemists to Aid Research at Hilton-Davis

The addition of four new chemists to the research laboratories of the Hilton-Davis Chemical Co, Division of Sterling Drug Inc, has been announced by Chester H Allen, director of laboratories.

ALEXANDER AVERBACH joins the staff of DR DONALD S HIRTLE as a senior research chemist. Formerly with American Aniline Products at Lockhaven, Pa, he specializes in textile dyes and allied products.

ERNEST L FIELD, senior research and development chemist, comes to Hilton-Davis from the Sterling-Winthrop Research Institute, Rensselaer, N Y, which conducts basic research for units of the Sterling organization. He will work with DR RAYMOND WERNER, group leader, on product improvement and pharmaceutical intermediates.

WALTER S HOGUE and JOHN W DELANEY will serve as research chemists.

• Du Pont Acetate Division Establishes Separate Organizations

Separate organizations to handle the manufacturing activities and sales of acetate rayon and "Orlon" acrylic fiber have been established in the Du Pont Company's Acetate Division. The new operating plan, which became effective the first of last month, was announced by Dr G Preston Hoff, manager of the division.

THOMAS H URMSTON, assistant manager of the division, will continue in charge of acetate rayon operations. J N TILLEY, who recently was made an assistant manager of the division, will head the activities for Orlon acrylic fiber. Four management promotions were included in the new organization.

WILLIAM L SCARBOROUGH, manager of the acetate rayon plant at Waynesboro, Va, since May, 1950, becomes director of acetate rayon production with headquarters in Wilmington. A B WALMSLEY, JR, present director of production, will continue in that position in charge of Orlon. ANDREW A SMITH, manufacturing superintendent at the Waynesboro plant since November, 1950, succeeds Mr Scarborough as manager of the plant.

HENRY C FROEHLING, an assistant director of sales, becomes director of sales for acetate rayon. GEORGE S DEMME continues as director of sales for Orlon, and LEONARD A YERKES, JR, will continue as assistant director of sales for Orlon. Mr Yerkes will also be in charge of sales promotion and development and fabric development.

W D R STRAUGHN, manager of the technical service section, becomes assistant director of sales for acetate rayon.

AATCC CONVENTION ISSUE APPEARS OCTOBER 1st

• R I Baker Elected Bank Director

RUSSELL I BAKER, plant manager of the Grasselli Works Division, General Aniline & Film Corp, Linden, N J, was elected a director of the Central Home Trust Company, Elizabeth, N J, at a meeting of the board on July 24. Mr Baker has been associated with General Aniline for more than 31 years.

• Blank Named Asst Sales Mgr

ALBERT G BLANK, a member of the Dryer Division Sales Department of Proctor & Schwartz, Inc, has been named assistant sales manager.

Mr Blank has been in sales work with Proctor & Schwartz since 1934. He joined the Proctor organization in 1929—working for his first five years with the firm in the Outside Research Department, where he spent much time in the field working on Proctor equipment of established design and new equipment as it was being put into operation in customer's plants.

In his new position, Mr Blank will be responsible for developing sales planning and will assist MYRON T FLEMING, recently-named vice president in charge of dryer sales.

• PTI Faculty Promotions and Additions

Three promotions and an equal number of new appointments have been made at the Philadelphia Textile Institute for the Fall term.

HARRY H BIRKBY, a former instructor in dyeing, has been promoted to the post of assistant professor in dyeing. GEORGE G BYLER, formerly an assistant professor in chemistry, becomes an associate professor. LILLIAN WYATT, PTI Librarian, has been promoted to the rating of assistant professor.

New appointments in weave formation and fabric analysis include: DAVID GIESE, an assistant professorship; DAVID HERMAN, an instructorship; and BERT AMADOR, a special assistant instructorship.

• Eight Honored by Textile Institute

Eight American and Canadian textile experts were recently honored by the British Textile Institute, five being elected to Fellowship and three to Associateship.

Elected to fellowship:

RICHARD SHOEMAKER COX, dean of the Philadelphia Textile Institute.

HERBERT FREDERICK SCHIEFER, physicist in the Textile Section of the National Bureau of Standards

GEORGE S BUCK, JR, technical director of the National Cotton Council of America

WALTER M SCOTT, assistant chief, Bureau of Agricultural and Industrial Chemistry, U S Department of Agriculture

EMERY I VALKO, research consultant to manufacturers of textiles and textile chemicals

Elected to Associateships:

J R STEWART, head of the Department of Textile Chemistry & Dyeing, Provincial Institute of Textiles, Ontario.

ALFRED HENRY PIERCE, Canadian Cottons Ltd Mills.

EDWARD SZLOSBERG, Sandoz Chemical Works, Inc, New York.

• Bates New Solvay Vice President

The appointment of CARLTON BATES as vice president in charge of the Alkali Section of The Solvay Process Division, Allied Chemical & Dye Corporation, was announced early last month.

Mr Bates succeeds R H PERKINS who has been in Solvay's employ for 39 years and has requested that he be relieved of the heavy duties of his present position. Mr Perkins will continue with Solvay as a consultant until the end of the year.

Mr Perkins became a Solvay Vice President in 1945. Prior to that time, he occupied the position of Director of Operations for fifteen years with offices in Syracuse.

Mr Bates has been employed by Solvay for 35 years and succeeded Mr Perkins as Director of Operations in 1945. For some ten years previous to that, he had been Manager of the Company's Baton Rouge, Louisiana plant.

H R MARGETTS has been promoted to the position of Director of Operations. Mr Margetts first came to work for Solvay in 1918. Appointed Production Manager in 1942, he became Assistant Director of Operations in 1945.

George F Long

• Hardesty Appoints Long

W C Hardesty Co, Inc, has announced the appointment of GEORGE F LONG to their textile sales engineering staff. Mr Long has fifteen year's experience in technical sales work beginning with the testing and development laboratory of Limerick Yarn Mills, Limerick, Me. Later he was associated with the Ludlow Mfg and Sales Co, Ludlow, Mass, and subsequently with Swift & Co as district sales manager in New England in charge of their Industrial Oil Department.

NEW PRODUCTS AND DEVELOPMENTS

• Barisol BRM, New Dye Assistant

Numerous plant applications of Barisol BRM, Dexter Chemical Corporation's new dye assistant, have revealed its unusual sequestering powers for the various pectins and other complex substances normally found in cotton.

As a wetting agent and dye leveller stable to boiling alkaline solutions (Dexter claims that refluxing for 24 hours with a 3% to 6% caustic solution does not break it down), the product was first introduced for vat and sulfur dyeing of cottons.

A trial of Barisol BRM in the kier first revealed its properties for clearing the bath and preventing deposits of scum on the interstices of the fabric. This led to its further trial in the caustic solution of the continuous alkaline boil-off.

The product is an organic phosphate with several phosphate radicals built into the molecular structure.

2% to 3% of Baristol BRM on the weight of the goods is said to provide clear baths and excellent dye dispersion in vat and sulfur dyeing. In continuous alkaline boiling-off, 1% to 2% on the weight of the goods will reportedly clear the bath and permit faster processing of heavy goods.

• New Additions to Berkshire's Durofast Series

Two new additions, Durofast Neutral Grey GL and Durofast Blue LGLL have been added to Berkshire Color & Chemical Company's "Durofast" series of direct fast colors for rayons and cottons.

Durofast Neutral Grey GL is a true neutral, direct dyeing grey said to be extremely fast to light (60-100 Fade-Ometer hours), washing (120°F) and perspiration, and stable to resin and copper-complex after-treatments. Berkshire suggests its adaptability for production of various delicate and popular pearl grey shades. Plant runs with the grey reportedly have shown it to be a valuable aid in cutting down dyeing time since less shading is required and there is less tendency to "over-shoot" in matching delicate shades. It is said to draw fairly rapidly and to maintain a true cast during the dyeing cycle. Both nylon and acetate effects are reserved and protein fibers are slightly stained, the manufacturer states.

Durofast Blue LGLL is a direct dyeing medium blue reported to be of outstanding fastness to light, washing and perspiration. When after-treated with various copper-complex compounds, a washfastness of 160° can be obtained, it is pointed out. Of considerable tinctorial value, this blue reportedly can be used as a bottom for full-bodied navies where light fastness of 100 hours can be obtained. Under artificial light the color maintains its green cast. Berkshire states that this blue is a distinctive improvement over older types in its ability to draw evenly at low temperatures, and in its reserve of the acetate fiber, nylon fibers are very slightly stained.

Berkshire suggests the new grey for suitings, rain wear, upholstery, rugs, etc and the new blue for resin after-treatments.

• Eastman Blue GLF Conc

A new blue acetate dye, requiring no inhibitor against gas fading, has been announced by Tennessee Eastman Company, Kingsport, Tenn. The dye, known as Eastman Fast Blue GLF Concentrated, is said to provide excellent light fastness properties on Dacron, dynel and cellulose acetate fibers.

The new Eastman blue is said to be the first blue acetate dye on the market to combine both fastness properties and is expected to find extensive use in men's suitings, dress goods, draperies, upholsteries, etc. The manufacturer also reports that it is the only blue dye presently available which provides such fastness properties on Dacron.

Eastman Fast Blue GLF is recommended by the manufacturer for self shades as well as in combination with other acetate dyes with similar fastness properties. Dye bath

temperatures from 180 to 200°F are suggested for obtaining maximum fastness and optimum leveling and exhaustion. The new blue should be dyed with 1% sodium meta phosphate on the weight of the fabric and with ¼ to ½% sodium acid phosphate or tartrate in the dye bath, according to Eastman, who further suggests that anionic rather than nonionic detergents and leveling agents be used.

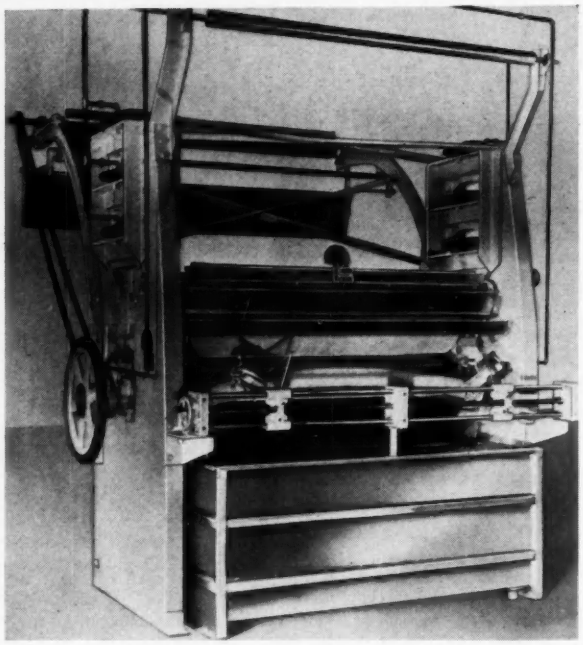
Eastman Fast Blue GLF reportedly can be dyed directly into Dacron using a small amount of "carrier" in the bath. The complete procedure is available from Tennessee Eastman on request.

• R & L Padder Utilizes Air Motors

More even pressure from side to side is reportedly obtained in a new-type Riggs & Lombard padder by means of 3-diaphragm type air motors, which are said to be free of friction and air leakage for all practical purposes. Maintenance economy also enters the picture on this padder since the bottom (stainless-steel) roll does not have to be removed for periodic regrinding.

The new unit has heavy duty stands complete with heavy duty steel pipe tie girts. Bottom roll is stainless steel jacketed, while the top roll is rubber covered. Bearings are heavy duty roller type in cast iron housings, with one side of fixed type and the opposite side, the floating type.

Pressure is obtained through use of the air motors on each side, each set of which is connected to a sliding yoke that comes down directly on top of the top roll bearings. The air motors reportedly give a pressure of 350 pounds per linear inch of roll surface, which in the case of the unit pictured gives a total load of 24,000 pounds.



R & L Type AD18 Padder

For top roll lift equipment, there are two 5" standard type cylinders equipped with levers so that when pressure is released from the diaphragm motors the top roll may be lifted out of contact with the bottom roll.

At the entering side, a stainless steel tank with suitable immersion rolls is located under the main rolls. A set of cloth guiders at the entering edge of the tank keeps the cloth centered as it goes into the tank. Just ahead of the main rolls, a single expander roll ensures that the cloth goes into the rolls open width and free from wrinkles.

To keep the roll free from flocks, a flock brush (with flock tray) is located on top and in front of the top main roll. At the delivery side of the machine is a folder which receives its drive through roller chain and sprockets from the bottom main roll. The main drive is normally through a variable speed unit, so that cloth speed may be varied as required.

The main rolls of the pictured unit are 18" diameter by 72" face, though they can be of various lengths.

TECHNICAL LITERATURE

Syton C-30

Merrimac Division
Monsanto Chemical Company
Everett, Massachusetts

Numerous applications and general properties of this chemical, a colloidal solution of hydrated silica in water, are given in this bulletin. They include its use as an antislip agent in emulsion type waxes, as an antiblocking and gloss-controlling agent in water-based finishes, latex and other similar compounds, and for modification of fiber-to-fiber friction during drafting operations in the manufacture of textile yarns.

Another application is the modification of paper and other film-like materials to improve wettability, absorption and other surface characteristics. Suggested uses include the application of Syton C-30 for improvement of latex and rubber products, for hardening the surface of water-based laminating resins, to aid in the suspension of pigments in aqueous systems, and as a mold lubricant.

The bulletin also outlines compatibility, the effect of salts, electrolytes, acids and alkalies, and shipment and availability.

Anhydrides (F-5280A)

Carbide and Carbon Chemical Company
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N Y
Available on request

All anhydrides offered by the company, their uses, physical properties and shipping data are described. Also included is a bibliography which lists all the important references to anhydrides in the chemical literature.

One section covers the specifications of the anhydrides with a complete description of the test methods used, both standard ASTM methods and those newly-developed at Carbide's laboratories.

Bibliography of Technical Reports (July, 1951 Issue)

Office of Technical Services
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Twenty-six letters patents owned by the Atomic Energy Commission and made available to industry under royalty-free license are featured, most of which will be of interest to the chemical processing industry.

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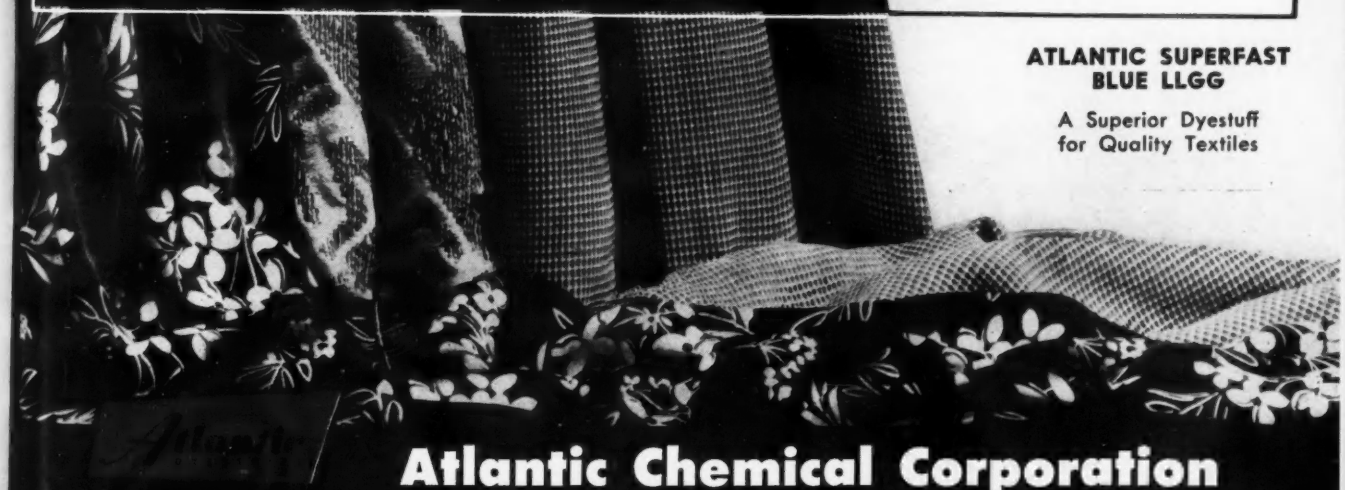

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FOR SALE: Garment Dyehouse. Location: Boston, Mass. Yearly gross: $15,000. Excellent for experienced dyer desiring own business with possibility of future expansion. Write Box No. 172.

POSITION WANTED: Experienced plant manager, dyeing, printing, finishing, box and jig work, good executive and production planner, quality and cost conscious, thorough knowledge all equipment, its operation and maintenance, full understanding of trade's demands and requirements, any location. Write Box No. 165.

CHEMIST: Established dyestuff manufacturer requires a Textile Chemist with laboratory and/or plant experience in dyeing synthetic fibers for a responsible position in their New York Laboratory. Write Box No. 166.

SALES MANAGER WANTED for well-known, long-established, medium-sized company manufacturing textile chemicals. Applicant must be well introduced to textile mills. Attractive opportunity for capable man. Submit complete data of qualifications, salary expected in first letter All information will be kept in strictest confidence. Write Box No. 168.

MANUFACTURERS AGENTS wanted for well-known, long-established, medium-sized company manufacturing textile chemicals. Applicant must be well introduced to textile mills. Territories: Canada, New York State, New England States, New Jersey and Pennsylvania or parts thereof. Attractive opportunity for right men, who would share in already existing business. Submit complete data of qualifications and photo in full confidence in first letter. Write Box 171.

POSITION WANTED: Textile chemist with broad experience in the development and production of textile chemicals seeking responsible position with commensurate salary. Opportunity for firm to acquire service of top-notch plant chemist. Would also be interested in producing on salary with opportunity of becoming part of firm. Write Box No. 176.

POSITION WANTED: Finisher—15 years experience with large reputable concerns on piece goods. Capable of taking full and complete charge of finishing department. Qualified and experienced in the most modern methods of finishing on all types of silks, synthetic fabrics, and blends. This includes crush-proofing, stabilizing, permanent and non-permanent water repellents, specialty and plain finishing of all types. Family man, 40 years of age. Excellent references. Write Box 173.

POSITION WANTED as finisher on the west coast. CRF, water repellent, spuns, prints, etc. Write Box No. 174.

POSITION WANTED: Experienced chemist, 16 years production and development textile specialties. 5 years textile print works. Desires responsible position. Write Box No. 175.

WANTED: Salesman. Large, well-established dyestuff manufacturer desires an experienced salesman for southern territory. Experience as technician and/or salesman essential for consideration. Attractive salary and future. Write Box No. 177.

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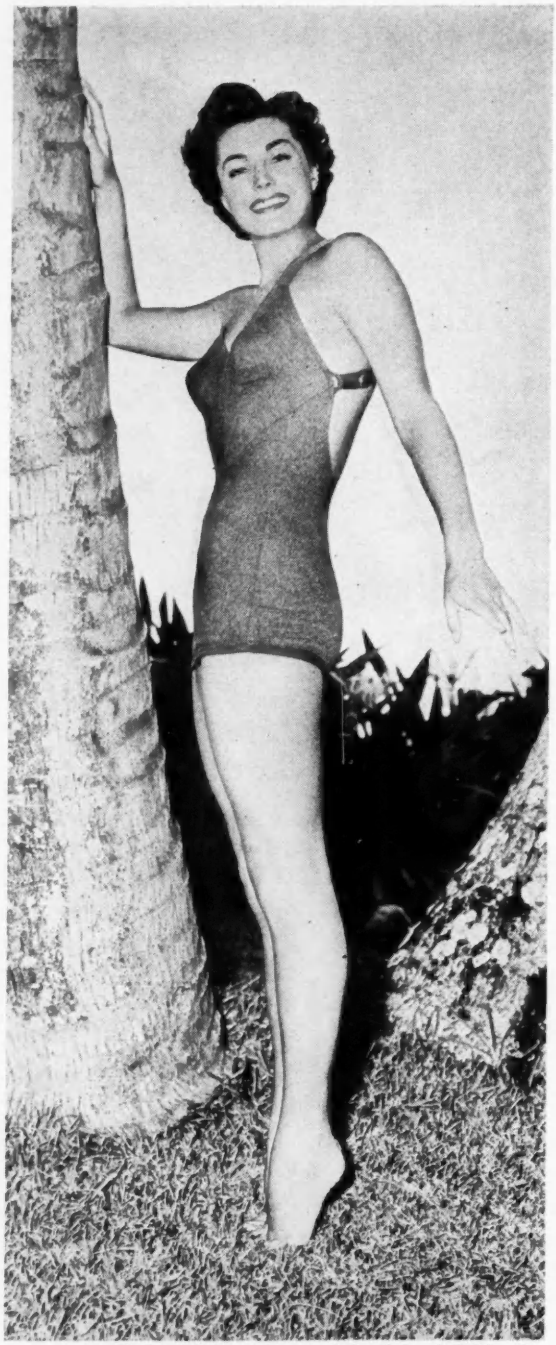

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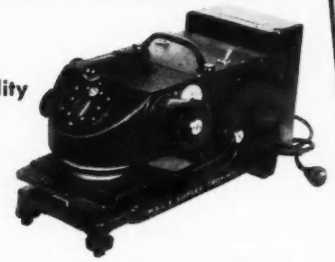

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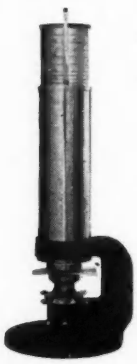
Wind-proofness, coating penetration, filler-retention and water-resistance are some of the many fabric properties accurately measured with this versatile instrument. Send for Bulletin 1600.

*Conforms to ASTM "Tent. Meth. of Test for Air Permeability of Text. Fabrics"—D737-48T



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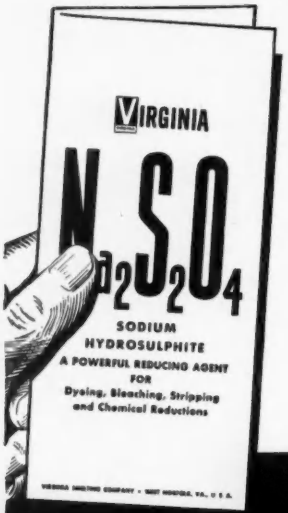

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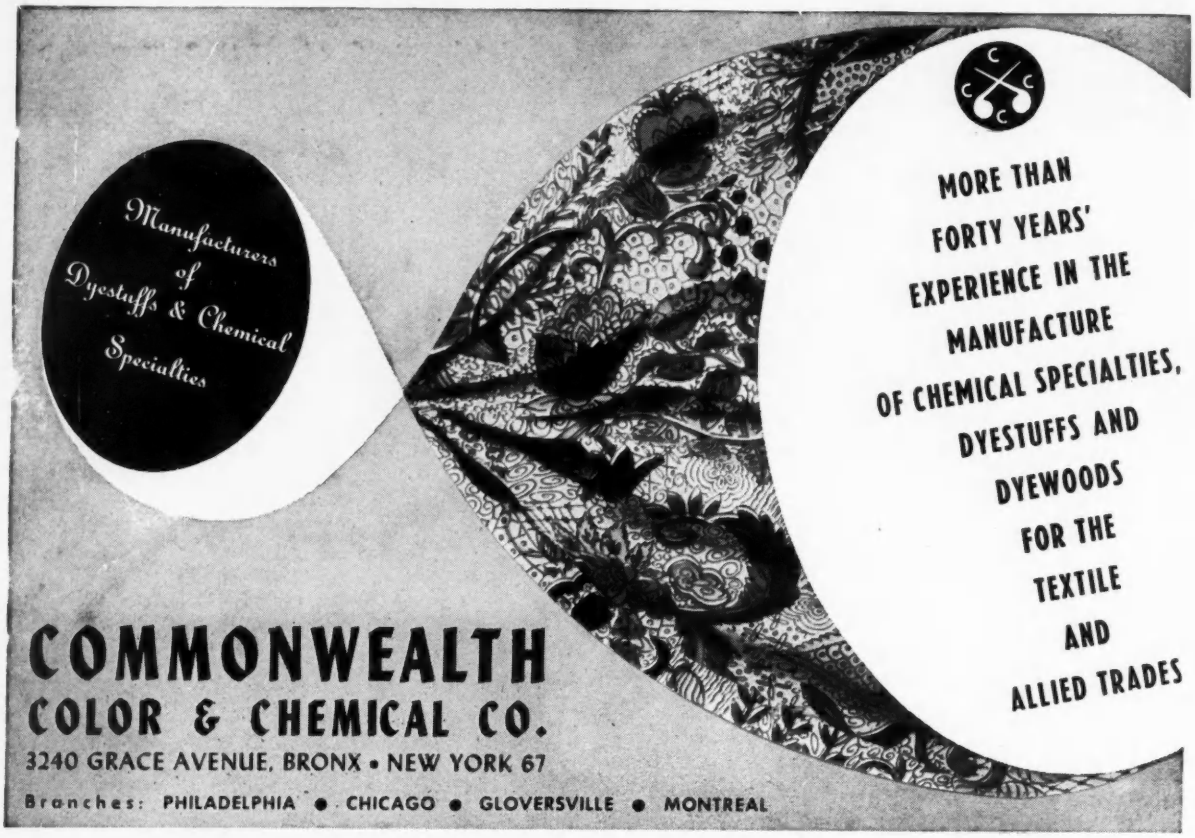

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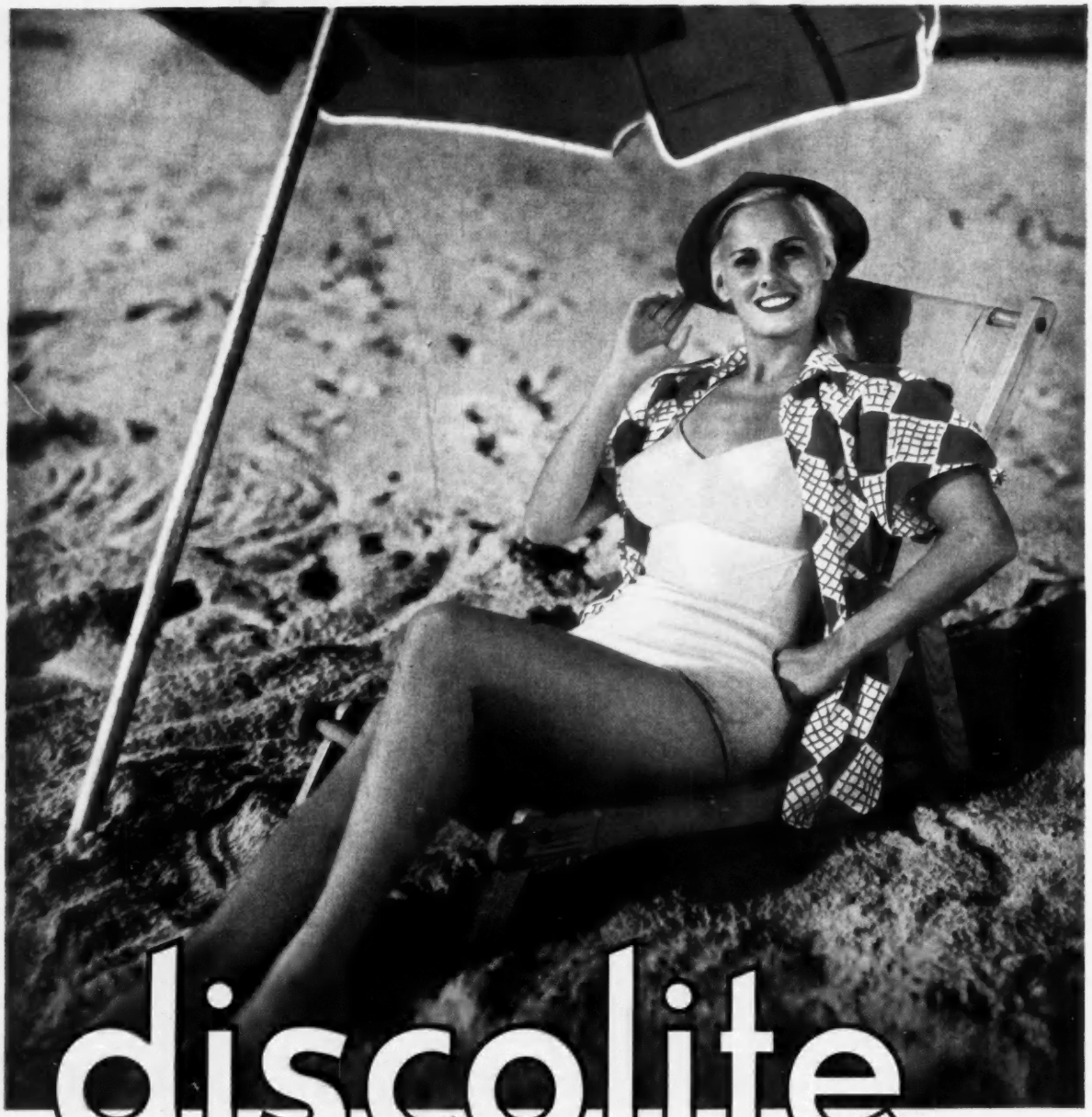

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